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Food Technology Abstracts

Central Food Technological Research Institute, Mysore.

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FOOD TECHNOLOGY ABSTRACTS

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
p	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

1782

Ghosh (BC) and Satish Kulkarni. **Standardization of manufacture of kadhi powder.** *Journal of Food Science and Technology (India)* 28(1): 1991: 12-14

Addition of 5% gram flour as thickening material, 0.03% turmeric powder as colouring and flavouring material and 0.5% salt were found to be suitable for the preparation of kadhi. For the preparation of kadhi powder, a min. fat of 0.8% in dahi and total solids in the range of 15-18% in slurry were found to be optimum. Restricting the acidity in dahi to 0.8-1.0% did not pose any serious problem during drying and also resulted in good quality product. Reconstitution of 1 part of powder with 4 parts of water resulted in a product comparable to control kadhi. The product kept good for nearly 3 months when packed in LDPE pouches at ambient temp. of storage. AS

1783

Foster (A). **The impact of consumer acceptance on trade in irradiated foods.** *British Food Journal* 92(5): 1990: 28-34

This article concentrates on the most recent development relating to food irradiation in Europe as well as the more general impact of consumer acceptance on trade in irradiated foods. BV

1784

Hagenmaier (RD) and Shaw (PE). **Moisture permeability of edible films made with fatty acid and (hydroxypropyl) methylcellulose.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1799-1803

Edible films made up of 55% (hydroxypropyl) methylcellulose and 45% stearic acid had permeability of 0.17 plus or minus 0.04 g mil/(m^2 day mmHg), evaluated with 85% RH on one side of the film, 0% on the other. The permeability was unchanged at 94% RH. It was higher at 97-99% RH and also higher if shorter chain fatty acids were substituted for stearic acid. Permeability increased 10-fold when stearic acid crystals were removed from the surfaces of the film. The permeability was higher when the more crystalline side was toward the high-humidity atm. Tensile strength of the film decreased rapidly at values of RH above 90% on both sides of the film. AS

1785

Sebedio (J-L), Bonpunt (A), Grandgirard (A) and Prevost (J). **Deep fat frying of frozen prefried French fries: Influence of the amount of linolenic acid in the frying medium.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1862-1867

Frozen prefried French fries containing about 2% lipids were fried in peanut and soybean oils. 30 frying operations were effected at 180 C for 5 min. The polymer content of both the oil and the French fries was studied as well as the amount of polar components. The cis and trans 18:1 isomers were isolated by using a combination of HPLC and silver nitrate TLC. The position of the ethylenic bond was determined after ozonolysis in BF 3-MeOH. The study of the components formed after frying at 180 C showed that soybean oil (containing close to 7% linolenic acid, 18:3 W 3) does not behave differently from peanut oil and that one should not do more than 15 frying operations at this temp. to keep the amount of polar components below 25%. Similar quantities of polar components and polymers as well as similar 18:1 fatty acid profiles were found in the lipids extracted from French fries after frying and in the frying oils. AS

FOOD PROCESSING

1786

Frenkel (C). **Disruption of macromolecular hydration - a possible origin of chilling destabilization of biopolymers.** *Trends in Food Science and Technology* 2(2): 1991: 39-42

Chilling temp. (0-15 C) disrupt the metabolism of plants, resulting in abnormal growth and development and, often, in the death of the plant. Sensitivity to chilling is a major constraint in the production and cold preservation of crops, but the metabolic origin of sensitivity to chilling is not clear and, consequently, the phenomenon is not easily controlled. However, recent data suggest that chilling may destabilize the assembly and function of biopolymers by disrupting macromolecule-water interactions. A similar explanation may account for the altered properties and quality of food crops that have been chilled. AS

FOOD PACKAGING

1787

Rubbright (HA). **Packaging of microwavable foods.** *Cereal Foods World* 35(9): 1990: 927-930

This feature article deals with recent developments in the packaging materials used for microwavable

foods. The author also discusses the advantages of microwave products as they are safe, sound, cost effective and efficient. PHR

Packaging materials

1788

Srinivasa Gopal (TK), Thankamma (R), Ramachandran Nair (KG), Prabhu (PV) and Madhavan (P). **Use of chitosan adhesive for the manufacture of corrugated fibreboard.** *Fishery Technology* 28(2): 1991: 154-157

Peeling strength of the kraft paper using 1.5% chitosan (in 1% acetic acid) adhesive of viscosities 20, 130 and 500 cp has been compared with starch adhesive having 10% solids. It was found that the peeling strength between kraft paper - kraft paper and kraft paper-corrugated fibreboard using 1.5% chitosan adhesive of viscosity 130 cp was same as that of starch adhesive having 10% solids. The peeling strength was greater in chitosan adhesive having viscosity of 500 cp. Lower viscosity chitosan adhesive (20 cp) gave lower peeling strength. The 5 ply corrugated fibreboard prepared out of chitosan adhesive possessed higher puncture resistance, flat crust strength and compression strength than the starch adhesive board. During frozen storage for 5 months, moisture content increased after 3 1/2 months in starch based and chitosan adhesive boards. It is concluded that chitosan adhesive corrugated fibreboard is an ideal substitute for starch based adhesive for the export of frozen shrimp. SRA

FOOD ENGINEERING AND EQUIPMENT

1789

Dodeja (AK), Sarma (SC) and Abichandani (H). **Thin film scraped suface heat exchanger and plate heat exchanger - a comparative study.** *Indian Journal of Dairy Science* 42(4): 1989: 757-759

The film heat transfer coeff. in plate heat exchanger (PHE) depends on velocity of working fluid through plates. Film coeff. in thin film scraped surface heat exchanger (SSHE) depends on mass flow rates, rotor speed and number of blades. For mass flow rate upto 1.9 x 10^{-2}kg/sec., the film coeff. for PHE is higher than SSHE. At higher mass flows thin film SSHE is superior. The power consumption in plate heat exchanger increases rapidly with mass flow rate. However, in thin film SSHE, power consumption is independent of mass flow rate. AS

1790

Moshfegh (B), Loyd (D) and Karlsson (B). **Thermal analysis of a passive heating system for food distribution.** *Journal of Food Engineering* 13(2): 1991: 135-149

Distribution of hot portioned food is not only a problem of transportation but also a time dependent thermal problem. Instead of traditional ways for protection of food from cooling a double-walled container with a phase change material (PCM), is proposed. A computational model is presented for the prediction of the food temp. inside the food container with PCM. Also the temp. of the food is determined experimentally in the container filled with mashed potatoes. The thermostatically controlled hot water bath method is used for charging the food container before temp. measurements. To enhance the accuracy of the numerical results, the thermal properties of the PCM had to be analysed. The melting and crystallization temp., the specific heat and the latent heat of the PCM are experimentally determined by the differential scanning calorimetry technique (DSC). The numerical predictions are compared with experimental results. The correlation between experimental results and the simulation model is excellent when the experimental values estimated for the crystallization temp., the latent heat and the specific heat of the salt are used in the simulation model. Finally, it is shown that the container suggested here is much more efficient than conventional equipment. AS

Engineering

1791

Jaswant Singh and Singh (BPN). **Development of a mathematical model for oil expression from a thin bed of rapeseeds under uniaxial compression.** *Journal of Food Science and Technology (India)* 28(1): 1991: 1-7

The mathematical model considered the radial movement of oil under vertical force application. It correlates oil expression with pressure, coeff. of consolidation and permeability, time of compression, area of cross section through which oil flow occurs and density of oil. Model adequately describes oil expression behaviour having close agreement with experimental values and holds for all values of time. AS

1792

Shin (S) and Bhowmik (SR). **Computer simulation to evaluate thermal processing of food in cylindrical plastic cans.** *Journal of Food Engineering* 12(2): 1990: 117-131

A computerized mathematical model was developed to evaluate the thermal processing of low acid foods in cylindrical plastic cans with various values of thermal diffusivity for the can wall. The model was based upon the solution of heat conduction equations by the modified alternating direction implicit technique, the Douglas algorithm. This method was used successfully in estimating the time-temp. profile at various locations in the can wall and the food. The program was capable of running on a high speed personal computer. The sterilizing values were found to be more affected by wall thickness than the thermal diffusivity of the wall. AS

1793

Ghazala (S), Ramaswamy (HS), van de Voort (FR) and Al-Kanani (T). **Kinetics of colour development in aqueous systems at high temperatures.** *Journal of Food Engineering* 13(2): 1991: 79-89

Kinetics of colour development at high temp. were studied in aqueous solutions containing the colour-forming compounds glucose and glycine, as well as a combination of these with ascorbic acid and thiamine. The formed colour in test samples sealed in glass ampoules subjected to various time-temp. treatments was evaluated using CIE parameters (luminance factor, r% and chromaticity coordinates, x and y). The study indicated that the colour development could be described by first-order kinetics ($r^2 > 0.92$). AS

1794

Alhamdan (A) and Sastry (SK). **Natural convection heat transfer between non-newtonian fluids and an irregular shaped particle.** *Journal of Food Process Engineering* 13(2): 1990: 113-124

Natural convection heat transfer was investigated between aqueous solutions of sodium carboxymethylcellulose (modeled as power law fluids) and a mushroom shaped particle, under transient conditions, with various initial temp. differences. Convective heat transfer coeff. (h) were observed to decrease over time due to thermal equilibration. The av. value of h was significantly higher for heating (75 to 310 $w/m^{2}{\cdot}C$) than for cooling (22 to 153 $w/m^{2}{\cdot}C$), and decreased with increasing viscosity (CMC concn.). For the lower viscosity ranges, h increased significantly with increasing initial temp. difference. Correlations were developed between Nusselt number and generalized Rayleigh and Fourier numbers. AS

1795

Rico-Pena (DC) and Torres (JA). **Oxygen transmission rate of an edible methylcellulose-palmitic acid film.** *Journal of Food Process Engineering* 13(2): 1990: 125-133

Edible coatings with low potassium sorbate permeability could be used to increase the microbial stability of food surfaces. However, such coatings could induce anaerobic food conditions if their oxygen permeability were low. The oxygen permeability of an edible emulsion film (av. thickness, 55 μm), composed of methylcellulose and palmitic acid (wt. ratio of 3:1), was evaluated at 24 C , atmospheric pressure, and at different percentages of relative humidity (RH). RH values in the 0-57% range had no significant effect on oxygen transmission rate (OTR); calculated OTR values ranged from 660 to 740 mL O_2 (STP)/m^2 24 h atm. At 79% RH, the OTR doubled to 1,500 mL O_2 (STP)/m^2 24 h atm. This effect correlated well with the moisture isotherm for the film which showed a low moisture content in the 0-57% RH range and a rapid increase at higher RH values. OTR values, particularly at high RH, indicate no risk of developing anaerobic conditions on the food surface. AS

1796

Bergman (B-O) and Tragardh (C). **An approach to study and model the hydrodynamic cleaning effect.** *Journal of Food Process Engineering* 13(2): 1990: 135-154

A sensor has been developed for continuous measurements of the removal of deposit. The sensor, which was based on heat transfer measurements, was also able to measure the wall shear stress. The device was used to study the mechanical effect during cleaning. It was found that the removal rate of deposits, at a surface, could be scaled by the mean wall shear stress. Measurements were performed under both laminar and turbulent flow conditions. The turbulent fluctuations did not influence the removal rate. AS

1797

Larkin (JW). **Mathematical analysis of critical parameters in aseptic particulate processing systems.** *Journal of Food Process Engineering* 13(2): 1990: 155-167

A sensitivity analysis of a one-dimensional heat transfer model for a heat-hold-cool aseptic system of food products containing particulates was completed for 18 different design, product, and process control parameters. All of the parameters, except the direct effect of the fluid specific heat, were determined to be statistically significant in influencing the accumulated lethality of the processes. The most influential parameters were surface heat transfer coeff. in the hold tube at the fluid-particle interface, exit temp. of the fluid from the heater, initial temp., holding tube size, and

holding tube-U value. The process/product-related parameters that are significant in the establishment of a process are: particle diameter, surface heat transfer coeff. in the hold tube at the fluid-particle interface, thermal properties of the fluid and particulates, max. heater velocity ratio, max. hold tube velocity ratio, surface heat transfer coeff. in the heater at the fluid-particle interface, product flow rate, and particle to fluid ratio. AS

1798

Fryer (PJ) and Belmar-Beiny (MT). **Fouling of heat exchangers in the food industry: A chemical engineering perspective.** *Trends in Food Science and Technology* 2(2): 1991: 33-37

This review suggests that chem. engineering analysis can be of use in the food industry where fouling and cleaning of process plants pose a serious problem. The interaction between the chemistry and the fluid mechanics of process plants makes it difficult to deal with the problem. BV

Equipments

1799

Yacu (W). **Process instrumentation and control in food extruders.** *Cereal Foods World* 35(9): 1990: 919-926

The different processing conditions such as feed ingredient comp., particle size, feed rate, extruder design and operating conditions and their relation to the end product quality has been outlined in this article. PHR

1800

Gaines (CS). **Use of a spindle-type viscometer (Brookfield) to measure the apparent viscosity of acidulated flour-water suspensions.** *Cereal Foods World* 35(8): 1990: 741-747

1801

Mohamed (IO) and Ofoli (RY). **Prediction of temperature profiles in twin-screw extruders.** *Journal of Food Engineering* 12(2): 1990: 145-164

A model incorporating viscous dissipation effects and a heat transfer coeff. based on the Brinkman and Graetz numbers is presented for predicting the temp. profiles of non-Newtonian food doughs in a twin-screw extruder, assuming uniform product temp. in the direction normal to the screw shafts. Experimental measurements were obtained to evaluate the model for 3 screw configurations: 30 degree forwarding paddles (30 F), feed (two-start or double-flighted) screws and single-start (single-flighted or single-lead) screws. Model predictions were well within engineering accuracy for 30 F paddles and feed screws under all experimental conditions. Predictions for single-start screws were inaccurate, with deviations of up to 50%. In general, results indicate that the one-dimensional energy equation is sufficient for heat transfer analysis of extruder sections configured with mixing paddles and feed screws, particularly at high flow rates, high r.p.m., or combinations of the two variables. However, the level of mixing provided by single-start screws over the r.p.m. and flow rates used in this study does not justify the assumption of uniform temp. in the transverse direction. For these screws, at least a two-dimensional formulation of the energy equation must be used. AS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1802

Chung (S) and Villota (R). **Changes in partition coefficients of alcohols as affected by the presence of various food solids.** *Journal of Food Process Engineering* 13(2): 1990: 169-189

Using homologous series of alcohols and varing temp., it has been demonstrated in this study that volatility of alcohols increases upon changes in the system which decrease their solubility in the liquid. Addition of solutes has various effects on volatility, depending upon their ability to interact with water and volatiles. Surface characteristics, including the number of binding sites and surface area, significantly affect interaction. When more than one type of solids is present, alcohols preferentially adsorb to the solid with higher affinity for alcohols, until all binding sites on the solid are occupied. Silica and soy protein increase solubility of alcohols in water by adsorbing them through hydrophobic association and/or hydrogen bonds. Sodium silicoaluminate, xanthan gum and, to some extent, maltodextrin show less interaction with alcohols than with water. AS

1803

Bushway (RJ), Helper (PR), King (J), Perkins (B) and Krishnan (M). **Comparison of ascorbic acid content of supermarket versus roadside stand produce.** *Journal of Food Quality* 12(2): 1989: 99-105

Seven vegetables and one fruit from two roadside stands and two major local supermarkets were analyzed for their ascorbic acid content. Produce was sampled during a 9 wk period from late July through September of 1987. Significant differences at the 0.05 level for ascorbic acid were observed between supermarket and roadside stand produce for potato, cauliflower, cabbage and tomato while no significant differences were found between cantaloupe, broccoli, green peppers and spinach from either market. Cabbage was the only supermarket item that was significantly higher in ascorbic acid concn. Very little dehydroascorbic acid was shown to be present in these vegetables and fruit making ascorbic acid an accurate indicator of total vitamin C activity for this study. The quality of freshness does not appear to be a major factor as to the amount of vitamin C present in these 8 products. AS

1804

Fischer (U) and Grosch (W). **Breakdown of the flavour compound 2(E)-hexenal in different solvents.** *Food Chemistry* 39(1): 1991: 59-72

The influence of the solvents 20% (v/v) aqueous ethanol (pH 3.5, Et) and triacetin (Tr) on the rate and on the products of the breakdown of 2(E)-hexenal at 38 C has been investigated. The rate constants (x $10^{-3}h^{-1}$), which were determined for hexanal (7.65 Et, 8.04 Tr), 2(E)-hexenal (3.8 Et, 9.8 Tr), 3(Z)-hexenal (20.08 Et, 26.35 Tr) and some C 7-aldehydes, indicated that 2(E)-hexenal was more stable in Et than in Tr. In Tr, autoxidation of 2(E)-hexenal to the corresponding acid was the major reaction and the minor product, butanoic acid, was the most important odour compound. In Et, the flavour potential of 2(E)-hexenal was lowered by the formation of 3-hydroxyhexanal and 3-ethoxyhexanal. Isomerisation of the 2(E)-double bond into 2(Z)-, 3(E)- and 3(Z)-double bonds also took place, affording among other compounds, 3(Z)-hexenal which, on the basis of its low odour threshold, predominated in the overall aroma. AS

1805

Wedzicha (BL) and Garner (DN). **The formation and reactivity of osuloses in the sulphite-inhibited Mmaillard reaction of glucose and glycine.** *Food Chemistry* 39(1): 1991: 73-86

A simple mechanism for the sulphite-inhibited Maillard reaction of glucose and glycine has been critically appraised. By spiking mixtures of glucose, glycine and hydrogen sulphite ion (S(IV)) with ^{35}S-labelled S(IV) or 3,4-dideoxy-4-sulphohexosulose (DSH), or ^{14}C-labelled 3-deoxyhexosulose (DH), it has been shown that the rate determining step is the formation of DH and that, while S(IV) is present, the major reaction product is DSH. Once S(IV) has run out, DSH shows significant reactivity. The rates of formation and loss of DH are analysed in detail. AS

1806

Cilliers (JJL) and Singleton (VL). **Caffeic acid autoxidation and the effects of thiols.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1789-1796

Initial oxygen uptake by o-dihydroxybenzenes is slowed by adding thiols like cysteine (Cys) or glutathione (GSH). One mole. of caffeic acid consumed 3.4 atoms of oxygen (O), which increased with thiol addition (Cys 5.5 and GSH 8.5 atoms of O per molecule of phenol). Under the same conditions cysteine or glutathione alone did not consume oxygen. Phloroglucinol did not consume oxygen, but when combined with caffeic acid increased total oxygen uptake (4.9 atoms of O per mole. of caffeic acid). This increased even further with the addition of thiols (Cys 8.1 and GSH 11.4 atoms of O per mole. of phenol) after 4 h. Catechin combined with caffeic acid behaved similarly but had a higher level of oxygen taken up in 3 h (Cys 11.2, GSH 17.0 atoms of O). Reversed-phase HPLC was used to study the reactions of caffeic acid (1 mM) with cysteine (4 mM) during chem. autoxidation. The formation and disappearance of 2-S-cysteinylcaffeic acid (2-CCA), 5-S-cysteinylcaffeic acid (5-CCA), and 2,5-di-S-cysteinylcaffeic acid (DCCA) were investigated. Caffeic acid oxidised correlated with brown (420-nm absorbance) formed. Thiol additions had protective effects on caffeic acid consumption. A golden yellow colour measured by 420-nm absorbance is produced at pH 9 and higher which only becomes an objectionable brown once cysteine is depleted. When cysteine is depleted, caffeic acid and the thioethers are rapidly oxidised with formation of brown rather than yellow colour. Concn. of either glutathione or ascorbic acid equimolar with caffeic acid had large protective effects against browning and caffeic acid disappearance at pH 7.0. AS

1807

Cilliers (JJL) and Singleton (VL). **Autoxidative phenolic ring opening under alkaline conditions as a model for natural polyphenols in food.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1797-1798

Ring opening occurred when phenanthrenequinone was subjected to alkaline (pH 13) oxidative conditions at room temp. in methanol and 100% oxygen. The reaction was followed by HPLC, and spectra were obtained with a diode array detector.

The spectra and retention times of the compounds formed were the same as those of authentic diphenic acid used as a standard and prove ring opening. Similar reactions have been hypothesized for o-dihydroxyphenols found in food systems. This research demonstrates its occurrence. AS

1808

Lepine (F), Milot (S) and Gagne (N). **γ-irradiation induced formation of PCB-solvent adducts in aliphatic solvents.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1873-1876

γ-irradiation induced formation of PCB-solvent adducts was investigated as a model for PCB residues in irradiated food. Formation of cyclohexyl adducts of PCBs was found to be significant when pure PCB congeners and Aroclor mixture were irradiated in cyclohexane and cyclohexene. Reaction pathways were investigated, and the effects of oxygen and electron scavenger were studied. AS

1809

de Lumen (BO). **Molecular approaches to improving the nutritional and functional properties of plant seeds as food sources: Developments and comments.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1779-1788

Contribution of plant seeds to human diets, need to genetically engineer legumes and cereals for improved nutritional properties, functional properties of proteins, genetic engineering strategies to increase the methionine content in legumes, molecular biology of proteinase inhibitors, carbohydrate synthesis and lipid metabolism and transformation techniques are reviewed. 159 references. BV

Chemistry (Analytical)

1810

Dunmire (DL) and Williams (RC). **Automated qualitative and quantitative NIR reflectance analysis.** *Cereal Foods World* 35(9): 1990: 913-918

1811

Fiebig (HJ). **Collaborative studies for the determination of iodine value.** *FAT Science Technology* 93(1): 1991: 13-19 (De)

Iodine value of large number of oil samples have been determined. Solvent carbon-tetrachloride is replaced by solvent cyclohexane and acetic acid mixture. Results are presented in tables. Insignificant difference noticed in iodine value by using above two solvents separately. N

1812

Amlathe (S) and Gupta (VK). **Spectrophotometric determination of acetone using vanillin.** *Analyst (London)* 115(10): 1990: 1385-1387

A sensitive method is described for the spectrophotometric detn. of acetone in water. Acetone reacts with vanillin in alkaline medium forming a yellow-orange dye with an absorption max. at 430 nm. Beer's law is obeyed in the range from 0.5 to 5 p.p.m. of acetone in water. Molar absorptivity and Sandell's sensitivity were found to be 11.0×10^{3} plus or minus 100 l $mol^{-1} cm^{-1}$ and 0.005 MUg cm^{-2}, resp. The important parameters for complete colour development were optimised and the method was used for the detn. of acetone in biological samples. The method was also applied successfully to the detn. of acetone in air after absorption in sodium hydrogen sulphite solution. AS

1813

Indyk (HE). **Simultaneous liquid chromatographic determination of cholesterol phytosterols and tocopherols in foods.** *Analyst (London)* 115(12): 1990: 1525-1530

A method is described for the simultaneous detn. of cholesterol, phytosterols and tocopherols in dairy and non-dairy foods by HPLC. A facile saponification and extraction scheme is completed rapidly within a single reaction tube. Clean-up is not required, with analysis completed by one of two alternative reversed-phase approaches. Sterols are monitored by short-wave ultraviolet spectrophotometry, and tocopherols by means of a series fluorescence detector. Cholesterol is resolved from the principal plant phytosterols, while the tocopherol congeners are well separated, thereby offering complementary information regarding source-lipid comp. in foods under regulatory quality-control conditions. Squalene, an essential metabolic sterol precursor, can also be determined concurrently at the same viewing wavelength. AS

FOOD MICROBIOLOGY AND HYGIENE

1814

Neidleman (SL). **Enzymes in the food industry: A backward glance.** *Food Technology* 45(1): 1991: 88-91

Enzymes

1815

Dziezak (JD). **Enzymes: Catalysts for food processes.** *Food Technology* 45(1): 1991: 78-85

This article discusses the enzymes which are commonly used in bakery products, dairy and juice processing industries. Aspects covered include: yeast, baked products (amylases (flour supplementation and retardation of staling) and proteases (improved machinability and bread quality), pentosanase); fruit and juice processing (pectinase, cellulase, and hemicellulase (increased juice yields and reduced juice viscosity) amylase and arabinase, lipases) and dairy processing (chymosin, lactase (enhanced digestibility, increased whey utilization, and reduced crystallization). BV

1816

Gross (A). **Enzymatic catalysis in the production of novel food ingredients.** *Food Technology* 45(1): 1991: 96-97, 100

The potential of enzymes as catalysts in the production of food ingredients is illustrated. The use of a lipase in the regio-specific transformation of fats and oils to produce β-monoglycerides; the use of a protease-based process, a highly regio- and stereospecific transformation to produce aspartame; and the use of cholesterol reductase to convert cholesterol into a nontoxic compound is covered. BV

1817

Penet (CS). **New applications of industrial food enzymology: Economics and processes.** *Food Technology* 45(1): 1991: 98-100

The cost-effectiveness of enzymes used in food industry is discussed. Covers factors affecting cost, use of DNA technology and applications of enzymes. BV

1818

Nielsen (HK). **Novel bacteriolytic enzymes and cyclodextrin glycosyl transferase for the food industry.** *Food Technology* 45(1): 1991: 102-104

Amylases

1819

Ranum (P) and Destefanis (VA). **Use of fungal α-amylase in milling and baking.** *Cereal Foods World* 35(9): 1990: 931-933

1820

Asp (EH). **Laboratory methods for α-amylase analysis.** *Cereal Foods World* 35(9): 1990: 941-946

This review article discusses the various colorimetric, chromatographic, viscometric and nephelometric methods developed or modified to measure α-amylase activity in cereals and cereal based products. PHR

Galactosidases

1821

Thompkinson (DK). **Immobilized systems for β-galactosidase.** *Indian Journal of Dairy Science* 42(4): 1989: 787-791

This article reviews the techniques employed and support matrixes used for immobilization of β-galactosidases for lactose hydrolysis and the properties of the resulting immobilized preparations. Adsorption, covalent bonding, gel entrapment and microencapsulation are the aspects covered. 60 references. BV

Ethyl alcohol

1822

Tabera (J) and Iznaola (MA). **Optimization of a continuous ethanol fermentation by the simplex method.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 230-238 (Es)

The optimization study by the Simplex method of a continuous ethanol fermentation with cell recycle by sedimentation is described. The six operating variables under investigation were: substrate concn. in feed, dilution rate, stirrer speed, aeration, recycled yeast flow rate and pumped-out yeast flow rate. Evaluation of the fermentation results was based on a response function including ethanol concn., yield and productivity data and their incidence in the process economics. With only 23 experimental runs the optimal zone was attained. Best results obtained were: ethanol concn., 56.6 g/l; ethanol-substrate yield, 49.2% (91.2% of stoichiometric yield), and productivity, 9.2 g ethanol/l.h. AS

1823

Cuesta (MA) and Cornejo (I). **Selection of *Candida pseudotropicalis* strains for ethanol production by mutagenesis. I. Ultraviolet light (UV).** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 239-246 (Es)

Ultraviolet irradiation was effective in inducing mutants which tolerated higher alcohol concn. and fermented higher lactose concn. than their original parents. This mutagenesis occurs at high kill

corresponding to 5 min exposure, from 23 cm away, on lactose-agar. Strains producing ethanol with efficiencies near 87% could be isolated in these conditions. AS

1824

Cuesta (MA) and Cornejo (I). **Selection of *Candida pseudotropicalis* strains for ethanol production by mutagenesis. II. Ethyl-methane-sulfonate and nitrous acid.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 247-253 (Es)

Ethyl-methane-sulfonate (EMS) was effective in inducing mutants which tolerated higher alcohol concn. and fermented higher lactose concn. than their original parents. This mutagenesis occurs at high kill corresponding to a 50 min exposure to 2.8% (v/v) EMS at 30 C. Strains producing ethanol with efficiencies near 90% could be isolated in thses conditions. Nitrous acid was not very effective. AS

1825

Chen (S) and Wayman (M). **Continuous production of ethanol from aspen (*Populus tremuloides* Michx.) cellulose by co-immobilized yeast and enzymes.** *Process Biochemistry* 24(6): 1989: 204-207

1826

Chithra (N) and Baradarajan (A). **Studies of co-immobilization of amyloglucosidase and *Saccharomyces cerevisiae* for direct conversion of starch to ethanol.** *Process Biochemistry* 24(6): 1989: 208-211

Bacteria

Clostridium botulinum

1827

Huhtanen (CN). **Metabolite growth of and toxin formation by *Clostridium botulinum*.** *Journal of Food Safety* 10(4): 1990: 253-265

It was observed that *Clostridium botulinum* types A, B, and F could grow in association with several aerobic and facultative microorganisms. In buffered media *C. botulinum* would grow. In unbuffered media *Enterococcus faecalis* and *Pediococcus cervisiae* produced enough acid to prevent toxin formation by *C. botulinum* but in buffered media toxin was produced. *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, *Yersinia enterocolitica*, strains of *Serratia*, *Pseudomonas*, *Alcaligenes* produced conditions favourable for toxin production under aerobic conditions. KMA

Clostridium perfringens

1828

Wrigley (DM). **Phospholipase C production and *Clostridium perfringens* growth in soy meal/ground beef mixtures.** *Journal of Food Safety* 10(4): 1990: 295-306

Clostridium perfringens ATCC 13124 grew well in ground beef-soy meal mixtures. Phospholipase C activity in the medium did not parallel the bacterial load. The concn. of phospholipase C in 24 h cultures were lower than the control if the beef to soy ratio was 1:1 or 1:3. Phospholipase C concn. was higher than the control when the beef to soy ratio was 9:1. KMA

Listeria

1829

Schiemann (DA), Shope (SR) and Brown (MJ). **Development of new environment broths and plating agars for isolation of hemolytic species of *Listeria*.** *Journal of Food Safety* 10(4): 1990: 233-252

A new media for optimal growth of *Listeria monocytogenes* was discovered. The growth was optimum at 37 C with 6.8 pH. This media was used for development of a highly selective plating agar which proved suitable for direct culture of vaginal and rectal swabs for *L. monocytogenes*. The same basal medium was used as a pre-enrichment broth and for the development of a selective enrichment broth which were incorporated into two-step enrichment procedure for the isolation of *L. monocytogenes* from foods. KMA

Listeria monocytogenes

1830

Tran (TT), Stephenson (P) and Hitchins (AD). **The effect of aerobic mesophilic microfloral levels on the isolation of inoculated *Listeria monocytogenes* strain LM82 from selected foods.** *Journal of Food Safety* 10(4): 1990: 267-275

Foods were spiked with *L. monocytogenes* and enriched at 30 C for 24 h in a selective enrichment broth. Ease of isolation of *L. monocytogenes* LM82 was independent of the food microflora concn. both generally and in the specific food type. The competition is due to specific bacterial competitors rather than bacterial numbers. KMA

Mushrooms

Volvariella volvacea

1831

Chaitali Das Gupta and Majumdar (SK). **Mineral requirements for growth of *Volvariella volvacea* mycelium by submerged fermentation.** *Journal of Food Science and Technology (India)* 28(1): 1991: 46-47

A study was made on the mineral salt requirements of *Volvariella volvacea* for growth in shake-flask fermentation. It was observed that KH_2PO_4, $MgSO_4.7H_2O$ and $CaCl_2.2H_2O$ were required at concn. of 0.1, 0.05 and 0.03% resp. The elements Fe, Zn, B and Mn were required in concn. of 3.6, 4.0, 15.0 and 0.5 µg/ml resp. for max. production of mycelium. AS

Yeasts

1832

Malik (NN) and Freitas (YM). **The effect of sodium chloride on single cell oil production by yeasts from marine sources.** *Indian Journal of Microbiology* 31(1): 1991: 101-103

Quantity of oil produced by two strains of *Brettanomyces custersii*, one strain of *Brettanomyces intermedius* and one strain of *Candida curvata* in different concn. of NaCl was studied. The yeast isolates were cultivated in 50 ml mineral salt yeast extract (MYE) medium, pH 6.0 with a salt concn. range of 0 - 10% (w/v); flasks were incubated at 28 plus or minus 2 C. After 48 h, the cells were harvested, oven dried at 80-90 C for 16 to 20 h, and analysed for lipid content. In both *B. custerii* strains, the amount of lipid produced increased with increase in salt concn. upto 6-7% and later decreased. With *C. curvata* strain lipid production increased upto 8% NaCl concn. and beyond this growth was reduced. In *B. intermedius* the lipid produced decreased with increase in NaCl concn. in the initial stage but increased between 3 and 7% NaCl concn. and decreased thereafter. In *B. crustersii* the lipid produced at 0-10% NaCl concn. ranged from 4.05 to 27.27/g of substrate in strain I and between 3.37 to 13.43 in strain II: the max. lipid production was at 6% NaCl concn. In *C. curvata* max. lipid produced was 15.99/g of substrate at 8% NaCl concn. Whereas in *B. intermedius* 12.18/g substrate was the max. lipid production at 7% NaCl concn. GS

1833

Buntemeyer (K), Kroner (KH), Hustedt (H) and Deckwer (W-D). **Process for large-scale recovery of intracellular yeast invertase based on heat- and pH-shift treatment.** *Process Biochemistry* 24(6): 1989: 212-216

Brewers yeasts

1834

Raspor (P), Russell (I) and Stewart (GG). **An update of zinc ion as an effector of flocculation in brewer's yeast strains.** *Journal of the Institute of Brewing* 96(5): 1990: 303-305

Zn^{++} ion was observed to be a strong effector of the flocculation-deflocculation process in an *in vitro* system for strains of *Saccharomyces cerevisiae* at ion concn. ranges that are normal in conventional substrates, such as wort. All strains of *Sacch. uvarum* (*carlsbergensis*) examined in this study did not exhibit any flocculation response to Zn^{++} ion. This test could be employed to distinguish between ale and lager flocculating yeast strains. AS

BIOTECHNOLOGY

1835

Ruttloff (H). **New developments in selected fields of food biotechnology.** *Die Nahrung* 34(7): 1990: 629-659

This paper reviews the current international knowledge in the fields of food biotechnology, with special reference to nutritional and physiological problems. The developments in technology, genetic engineering and protein technology is discussed. Single cell proteins (mushrooms, yeasts, bacteria, fungi, phototropic microorganisms), soluble enzymes, enzyme inhibitors, immobilized systems (enzymes, cells, new processes and products), amino acids, sweeteners, microbial polysaccharides as hydrocolloids, organic edible acid, plant cell and tissue cultures and flavourings (enzymes, microorganisms and plant systems). 290 references. BV

1836

Jones (JL). **DNA probes: Applications in the food industry.** *Trends in Food Science and Technology* 2(2): 1991: 28-32

DNA probes has revolutionized diagnostic technology in the clinical and forensic fields. Their power in detecting and characterizing specific organisms and material derived from the organisms is now being applied to problems in the food industry. So far, uses include the detection and assessment of foodborne pathogens; the diagonsis of crop and livestock diseases; the improvement of crop

and livestock breeding practices; and authenticity testing of meat products, plant material, and even documents and labels. Improvements in the user-friendliness of probe-based assays and wider appreciation of their applicability will further their adoption by the food science community. AS

TISSUE CULTURE

Nil

FOOD ADDITIVES

Annatto

1837

Murthi (TN), Devdhara (VD), Punjrath (JS) and Aneja (RP). **Extraction of annatto colours from the seeds of *Bixa orellana* using edible oils.** *Indian Journal of Dairy Science* 42(4): 1989; 750-756

Stabilizers

1838

Damasio (MH), Capilla (C), Costell (E) and Duran (L). **Influence of composition on mechanical properties of Kappa-carrageenan, locust bean gum, guar gum, mixed gels. Resistance to cut.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990; 254-265 (Es)

Effects of comp. of kappa-carrageenan (KC), locust bean gum (LBG) and guar gum (GG) mixed gels on their resistance to cut by wire and knife were studied. Two series of gels of 0.5 and 0.75% total hydrocolloid concn. (HC) were prepared with increasing proportions of KC substitution by either LBG or the mixture LBG + GG (1:1):10, 20, 30, 40, 50, 60 and 70%. Four parameters were obtained from the curves registered with either test: rupture force, cohesiveness, rigidity and av. plateau force. The effects of the type of gum and of the substitution percentage and the interaction between them were significant (p less than or equal to 0.05) for all parameters at both HC levels studied. The effect of the type of gum is clearly higher than the others. A paralelism was observed between the evolution with gel comp. of the different parameters, obtained in the wire and knife cutting tests. The correlation coeff. between each pair of parameters were close to 0.90 ($0.890 < r < 0.949$). Evolution patterns of each one of them informed on the texture changes produced by small gel comp. variations. AS

CEREALS

1839

Rishi (AK), Kapoor (R), Dhar (PL), Bhan (MK) and Nasir Ali. **Storage stability of hops (*Humulus lupulus* L.) and hop extract.** *Research and Industry, India* 35(2): 1990; 99-103

Four var. (Late Cluster, Hybrid-2, Comet and Talisman) of hops baled and unbaled (*Humulus lupulus* L) were uniformly exposed in the lab. at ambient temp. (4 - 30 C) for 2 yr. α-acids were estimated spectrophotometrically at the start and after every three months, for 2 yr. The % loss of α-acids during baling ranged from 7.29 - 17.96 and were in the order: Talisman < Hybrid-2 < Late Cluster < Comet. All the var. of hops, irrespective of baling or otherwise lost α-acids rapidly. These 4 var. when kept under baled condition on the shelf and in the dark cupboard, lost α-acids from 93 - 97 and 84 - 91% resp. after 2 yr. of storage. When hops are stored at lower temp. the storage stability is in the order: Late Cluster > Talisman > Hybrid-2 > Comet. The 2 var. of hop extracts when stored under different conditions for 2 yr lost α-acids in the order: exposed > kept in dark > kept at 5 plus or minus 1 C in dark. Of the 4 var. Late cluster extract (baled) has a better storage stability for α-acids at 5 plus or minus 1 C over 2 yr. Hop extract when kept under an inert atm. at 0 C is highly stable and undergoes insignificant loss of α-acids. GS

1840

Wall (JS). **The structural and genetic basis for the unique properties of cereal proteins.** *Cereal Foods World* 35(8): 1990; 715-724

This review covers Osborne's classification (nutritional and functional significance of prolamins and glutelins), prolamins (reversed phase HPLC, gliadins for wheat, corn zein sequence, protein solubilities and conformation), glutelins (intermolecular vs intramolecular bond). Use of SDS-PAGE, comp. of glutelin polypeptide chains, relationships among corn protein, gliadin-glutenin, and modification of Osborne's classifications. CSA

1841

Jones (CR). **The production of mechanically damaged starch in milling as a governing factor in the diastatic activity of flour.** *Cereal Foods World* 35(8): 1990; 765-784

1842

Cairns (P), Leloup (V), Miles (MJ), Ring (SG) and Morris (VJ). **Resistant starch: An X-ray diffraction**

study into the effect of enzymatic hydrolysis on amylose gels *in vitro*. *Journal of Cereal Science* 12(3): 1990: 203-206

The resistance to enzymatic hydrolysis exhibited by resistant starch has previously been attributed to the presence of amylose crystallites within the materials. However, the present study showed that though crystalline material may be resistant and although the amorphous material has been partially hydrolysed, it is the remaining amorphous material which must be the most significant contributor to the resistance to α-amylosis exhibited. PHR

1843

Anderson (IW). **The effect of β-glucan molecular weight on the sensitivity of dye binding assay procedures for β-glucan estimation.** *Journal of the Institute of Brewing* 96(5): 1990: 323-326

An assay procedure has been developed for quantifying β-glucan, based upon its reaction with the dye Congo Red. The sensitivity of this method to changes in β-glucan mol. wt. has been determined using β-glucans prepared from standard material by acid hydrolysis and comparison has been made with a Calcoflour-based method for quantifying β-glucans. The Congo Red assay was found to be optimally sensitive to β-glucans with mol. wt. of approx. 2.5×10^5 Daltons, whereas the Calcofluor assay was most sensitive to β-glucans with mol. wt. in excess of 5×10^4 Daltons. The purity of the β-glucan used during this investigation was determined using an enzyme-based procedure in which the polysaccharide was degraded to glucose by addition of β-glucanase. The β-glucanase employed was partially-purified from *Trichoderma viride* cellulase using a novel batch ion-exchange method which is also described. AS

Barley

1844

Ranki (H). **Secretion of α-amylase by the epithelium of barley scutellum.** *Journal of the Institute of Brewing* 96(5): 1990: 307-309

Aleurone-free scutella prepared from barley (*Hordeum vulgare* L. cv. Himalaya) grains after 1 day of germination released α-amylase into the incubation medium at a constant rate for at least 2 h. The release was arrested by a Golgi inhibitor, monensin which caused accumulation of α-amylase inside the scutella instead of the incubation medium. Immunofluorescence labeling showed that α-amylase in the scutella was located in the epithelial cells, no label was found in the parenchyma cells. These results indicate that the scutellar epithelial cells have a true capacity to synthesize and secrete α-amylase. AS

1845

Holmes (MG). **Studies on malting potential and physical attrition of malt and barley.** *Journal of the Institute of Brewing* 96(5): 1990: 311-321

Sequential pearling, pearlography and small-scale flour milling of malts and barleys were investigated as means of better predicting malting potential. Sequential pearling was used to describe varietal differences in rates of modification during malting. Sequential pearling gave no better prediction of malting potential than simple pearling. Malts which had been "stewed" during kilning could be recognized by their behaviour during sequential pearling. A barley pearler was modified to measure the torque required to pearl samples of barley and malt, giving pearlograms of torque versus time. Many barley var. had characteristic pearlograms, but malt pearlograms did not retain the distinctive features of their parent barleys. The pearlograms of malt were highly correlated with malting potential, whereas those from barley were not. The millability of malt correlated highly with coarse hot water extract and coarse fine difference. Both the quantity and extractability of the flour differed substantially between malts made from malting and feed var. and were related to malting potential. The millability of the parent barley, in contrast, was not correlated with the coarse hot water extract of the malt. Although offering extra information for the description of malting quality, neither sequential pearling, pearlography nor millability offered sufficient advantage over the simple pearling method for production of malting potential of barleys or micromalts from a breeding programme. AS

Paddy

1846

Krishna Rao (V), Ratnasudhakar (T), Sreerama Murthy (K) and Narayana Rao (PV). **Effect of common salt in preventing spoilage of wet paddy under inclement weather conditions.** *Journal of Food Science and Technology (India)* 28(1): 1991: 48-49

Mixing of 1 or 2% common salt either with 20% paddy husk or powdered paddy husk were found effective in reducing the moisture content and incidence of fungi, increasing the total and head rice recovery of wet paddy and preventing the sprouting of grain completely. Among these, 1% common salt with 20% paddy husk which is easily adaptable and convenient was superior without any adverse effect on quality of cooked rice. AS

1847

Krishna Rao (V), Joga Rao (V), Ratnasudhakar (T), Sreerama Murthy (K) and Narayana Rao (PV). **Effect of drying on microbial population of wet paddy using batch type dryer.** *Journal of Food Science and Technology (India)* 28(1): 1991: 50-51

Drying of wet paddy using batch type dryer at 45-55 C drying air temp. significantly minimised the bacterial and fungal populations. Reductions of microbial population at different drying air temp. were not consistent and did not show any definite trend. AS

Rice

1848

Sunita Kumari and Padmavathi. **An objective and sensory assessment of cooking quality of some rice varieties grown in Andhra Pradesh.** *Journal of Food Science and Technology (India)* 28(1): 1991: 31-34

Cooking qualities of 20 var. of milled paddy samples were evaluated by physical and chem. characteristics and palatability evaluation. Kernel dimension did not correlate significantly with the chem. characteristics. Palatability evaluation showed that short grain var. had better palatability scores than long grain var. Significant correlations were found among some of the physico-chemical characteristics and the latter with palatability evaluations. Highly significant correlations were found among palatability evaluations. Grain length, elongation ratio, gel length, amylose content and protein content are some of the characteristics of the rice used for predicting palatability. AS

1849

Gras (PW), Bason (ML) and Esteves (LA). **Evaluation of a portable colour meter for assessment of the colour of milled rice.** *Journal of Stored Products Research* 26(2): 1990: 71-75

A portable chromatic reflectometer, the "Minolta Chroma Meter" model CR-110 was compared with the mains-operated "Hunterlab Color Difference Meter" model D25D2M for the assessment of milled rice colour. Correlation coeff. for the blue-yellowness and lightness indices resp. for the two instruments were greater than 0.95. It is concluded that the portable "Minolta Chroma Meter" provides an objective means for monitoring changes in milled rice colour, suitable for use in grain handling and storage facilities. AS

1850

Chrastil (J). **Protein-starch interactions in rice grains. Influence of storage on oryzenin and starch.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1804-1809

Influence of storage on oryzenin, starch amylose, and amylopectin has been studied in grains of 2 U.S. rice var. (Lemont, long grain, and Mercury, medium grain). Although total protein and starch content did not change during storage, protein solubility decreased. Storage of rice grains, especially at higher storage temp., resulted in increased disulphide bonds and av. mol. wt. of oryzenin. On the other hand, the av. mol. wt. of amylose decreased, but that of amylopectin increased. Oryzenin interacted with starch by reversible binding to amylopectin and/or amylose. This binding decreased during storage, especially at higher storage temp. and was related to the stickiness of cooked rice. AS

1851

Cuevas-Perez (F) and Peske (ST). **Milling performance of rice varieties under different moisture absorption environments.** *Tropical Science* 30(2): 1990: 147-152

Moisture absorption environments of 10 C and 75% RH for 9 h, 30 C and 95% RH for 9 h and soaking in water at 28 C for 3 h were compared for their ability to detect consistently varietal differences in milling yields. Moisture changes and total milling and whole grain yields of 5 var., harvested during 3 different planting dates, were evaluated. Grain moisture increase varied from 0.3% to 11.7% among the different treatment and seed lots. Total milling yields were reduced by the soaking treatment, regardless of planting date and var. A strong interaction x planting date was detected for whole grain yields. The soaking treatment showed the best consistency in detecting varietal differences. AS

Rice bran

1852

Bera (MB) and Mukherjee (RK). **Flow behaviour properties of rice bran protein concentrate.** *Journal of Food Science and Technology (India)* 28(1): 1991: 27-30

Flow behaviour properties of rice bran protein conc. dispersions were studied at 3 levels of pH (8.0, 9.0 and 10.5) and different proteins concn. (4-24%). An increase in the protein concn. and pH of the dispersion increased deviation from Newtonian behaviour. Flow behaviour index of protein dispersion was not appreciably reduced with increase in protein concn. and pH. However, the consistency index increased with protein concn. and

pH. The yield value of full-fat rice bran protein conc. dispersion increased as protein concn. and pH increased, while change in pH had hardly any effect on yield value of defatted rice bran protein conc. Dispersions of 4-10% protein concn. showed mixed type flow properties i.e., dialatent and pseudoplastic. AS

Wheat

1853

Kruger (JE). **Instrumental assessment of sprout-damage in wheat at primary or terminal receival points.** *Cereal Foods World* 35(9): 1990: 935-939

1854

Zamponi (RA), Giner (SA), Lupano (CA) and Pnon (MC). **Effect of heat on thermal and functional properties of wheat.** *Journal of Cereal Science* 12(3): 1990: 279-287

The influence of hot air drying of wheat seeds on starch gelatinization and gluten proteins has been observed by using differential scanning calorimetry (DSC) and water absorption capacity assays, resp. The temp. of the first transistion and the enthalpies of the first and second transistion were determined by DSC in low and high-water systems. The results indicate that both starch annealing process and an increase in the water absorption capacity of gluten take place during seed drying. This, in turn, leads both to an increase of gelatinization temp. and to modifications in the enthalpy of the first transistion. AS

Wheat bran

1855

Gayal (SG), Khandeparkar (VG) and Rege (DV). **Enhanced $alpha$-amylase production on wheat bran medium by *Bacillus subtilis*-159.** *Journal of Food Science and Technology (India)* 28(1): 1991: 44-45

Effect of wheat bran on the production of amylase by *Bacillus subtilis*-159 was investigated. Wheat bran, at 1% concn. gave about 1.85 fold increase in amylase production than it is produced from Tendler's non-synthetic (TNS) medium (2.0-2.6 units/ml) within 48 h; however, at higher concn. of wheat bran the amylase production was retarded. Addition of $CaCO_3$ to the medium containing 4% wheat bran enhanced amylase production to 20 units/ml at 96 h. AS

Wheat products

1856

Dhanda (KC). **Marketing wheat products. 2. Management of channels.** *Indian Miller* 21(5): 1991: 19-23

Article covers the scope and importance of distribution management and functions of independently owned and company channels. Description is given of the independently owned channels which include agents, wholesalers, brokers and retailers. Company owned channels are direct, depots and retail showrooms. Vertical and horizontal are the types of conflicts among channels and the management of these have been indicated. The concept of physical distribution and the distribution cost have been worked out. SRA

Wheat proteins

1857

Wieser (H), Seilmeir (W) and Belitz (H-D). **Characterization of high molecular weight subunits of glutenin separated by reversed-phase high-performance liquid chromatography.** *Journal of Cereal Science* 12(3): 1990: 223-227

Four high mol. wt. (HMW) subunits of glutenin from the wheat var. 'Rektor' were isolated by preparative reversed-phase HPLC on C_8 silica gel, and characterized by amino acid analysis and by detn. of N-terminal amino acid sequences. These subunits had similar amino acid comp. with the highest contents of Gly (18.2-19.8 mol. %), Tyr (5.1-6.4 mole %) and Thr (3.2-3.8 mol %) of gluten proteins. Differences were observed in the content of single amino acids. Nine steps of Edman degradation revealed identical N-terminal amino acid sequences except for position 6 (Glu, Gly or Arg). The results agree with data for corresponding HMW subunits of other var. AS

1858

Scalon (MG) and Bushuk (W). **Application of photodiode-array detection in RP-HPLC of gliadins for automated wheat variety identification.** *Journal of Cereal Science* 12(3): 1990: 229-234

Spectral differences in components that were co-eluted in peaks of the RP-HPLC profiles of gliadins were examined by photodiode-array detection and expressed as absorbance index parameter of the peak spectra or absorbance of aromatic amino acids at 276 nm. Neither parameter, when incorporated in the wheat var. identification software as a third parameter in addition to peak retention time and peak height, improved the discrimination of wheat var. by computerized RP-HPLC. AS

MILLETS

1859
Ravindran (G). **Studies on millets: Proximate composition, mineral composition and phytate and oxalate contents.** *Food Chemistry* 39(1): 1991: 99-107

Grain samples of 6 var. of common millet (*Panicum miliaceum*), 3 var. of finger millet (*Eleusine coracana*) and 4 var. of foxtail millet (*Seteria italica*) were analyzed for their proximate comp., mineral comp. and phytate and oxalate contents. The av. protein contents of common millet, finger millet and foxtail millet were 14.4, 9.8 and 15.9%, resp. The crude fibre content of the millets ranged from 3.2 to 4.7%. In general, the mineral contents were high compared with those of other common cereal grains. In particular, the high level of Ca (0.24%) in finger millet was noteworthy. The high contents of phytic acid (0.50 - 0.70%) in millets present grounds for concern, in view of its interference with several minerals. The oxalate contents (21-29 mg/100 g dry wt.) of the millets were low. Considerable differences between- and within-millet were observed with regard to most nutrients analyzed. The overall results are suggestive of the under explored potential of millets as sources of dietary nutrients. AS

Corn

1860
Vivas-Rodriquez (NE), Serna-Saldivar (SO), Waniska (RD) and Rooney (LW). **Effect of tortilla chip preparation on the protein fractions of quality protein maize, regular maize and sorghum.** *Journal of Cereal Science* 12(3): 1990: 289-296

Protein solubility, mol. wt. distribution and pepsin-digestibilities of tortilla chips prepared from quality protein maize (QPM), regular maize and sorghum kernels were determined. QPM products contained higher amounts of extractable albumins plus globulins than regular maize and sorghum. Tortilla chip preparation decreased the solubility of proteins in salt-water (albumins plus globulins) and alcohol (prolamins) and increased the amount of unextractable proteins. Polyacrylamide gel electrophoresis in the presence of sodium dodecyl sulphate exhibited fewer bands for albumins plus globulins in all grains and for prolamins in sorghum. Processing all grains into tortilla chips decreased protein digestibilities as estimated using the pepsin assay. Sorghum was the cereal most negatively affected by processing and possessed the lowest protein digestibility. AS

Sorghum

1861
Wongo (LE) and Pedersen (JR). **Effect of threshing different sorghum cultivars on *Sitotroga cerealella* (Oliv.) and *Sitophilus oryzae* (L.) (Lepidoptera: Gelechiidae and Coleoptera: Curculionidae).** *Journal of Stored Products Research* 26(2): 1990: 89-96

Lab. studies were conducted to determine the effect of threshing different sorghum cvs on *Sitotroga cerealella* (Oliv.) and *Sitophilus oryzae* (L). In a no-choice test, data on progeny production, loss in grain wt., duration of development, and cv. index of susceptibility indicated that both species of insect responded differently when bred on unthreshed and threshold sorghum grain. On the av., unthreshed sorghum was more suitable than threshed sorghum for the development of *S. cerealella*, whereas threshold sorghum was found to be more suitable than unthreshed sorghum for *S. oryzae* development. Threshing did not have any influence on loss in grain wt. due to the feeding activities of the larva of *S. cerealella*, but *S. oryzae* caused considerably greater loss to threshed than unthreshed sorghum grain. The duration of development of both species of insect was not affected by threshing, but cv index of susceptibility was. The different sorghum cv had a significant effect on the performance of both *S. cerealella* and *S. oryzae*, indicating that some factors in the cv and in the insects themselves were responsible for the observed variation. In a free-choice test, where unthreshed and threshed sorghum grain was exposed to *S. oryzae* in the same chamber, more progeny were produced in the threshed than unthreshed sorghum. AS

PULSES

1862
Tovar (J), Bjorck (IM) and Asp (N-G). **Starch content and α-amylolysis rate in precooked legume flours.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1818-1823

Dried lentils (*Lens culinaris*) and beans (*Phaseolus vulgaris*, black, brown, white, and red) were boiled until soft, freeze-dried, and milled. This procedure yielded precooked flours (PCF), rich in intact cells filled with starch granules. Starch content in the various bean PCFs was underestimated by enzymic assays. Potentially available starch in PCFs was evaluated after complete release of starch by mechanical disruption of cell wall structures. Total starch content, measured after solubilization in 2 N KOH, was higher than the potentially available

starch, indicating that all PCFs contained important quantities of resistant starch, i.e., retrograded amylose (3-9%, dwb). Limited enzymic availability of starch in PCFs was also demonstrated by their low α-amylolysis rate. Pepsin preincubation and additional heat treatment increased the rate and extent of *in vitro* enzymic hydrolysis. Considerable differences in susceptibility to α-amylase attack were observed between the various legume flours. AS

Mung beans

1863

Vijaya (M), Sukanya (N), Savithri (HS) and Appaji Rao (N). **Isolation and characterization of a naturally occuring inhibitor from mung bean (*Vigna radiata*) seedlings for serine hydroxymethyltransferase.** *Indian Journal of Biochemistry and Biophysics* 28(4): 1991: 252-256

Mung bean seedlings (72 h old) were homogenised, centrifuged and solid ammonium sulphate was added. The pricipitate was dissolved in water and dialysed against double-distilled water and chromatographed. The inhibitor was adsorbed to the matrix. The fractions after elution with 50% ethylene glycol were monitored at 280 nm and assayed for the inhibitor activity. The inhibitor showed a peak at 200 nm. Heat treatment renders the inhibitor which is present as a small mol. wt. substance (10,000) bound to a protein, dialysable. Incubation with 6 N HCl at 37 C for 24 h, resulted in a marginal (10%) loss of activity. Protease and ribonuclease digestion did not affect the inhibitor activity. The inhibitor was pure chromatographically and had the positive charge at pH 4.3. SRA

Peas

1864

Owusu-Ansah (YJ) and McCurdy (SM). **Pea proteins: A review of chemistry, technology of production, and utilization.** *Food Reviews International* 7(1): 1991: 103-134

This paper reviews the protein content and quality of dry peas as well as processing and utilization of pea protein products. Covers chemistry, technology of production (dry milling and air classification, wet process), nutritional properties, functional and sensory properties (solubility, water binding, emulsifying properties, foaming properties, gelation and viscosity, flavour, colour, effect of processing on functional properties), utilization (bakery and cereal products (biscuits), meat products, imitation milk and milk products, textured products, others (jelly bean production, protein curd (tofu), soup and snack foods), limitations on studies to improve utilization and future research needs. 128 references. SRA.

Pea flour

1865

Leterme (P), Monmart (T) and Baudart (E). **Amino acid composition of pea (*Pisum sativum*) proteins and protein profile of pea flour.** *Journal of the Science of Food and Agriculture* 53(1): 1990: 107-110

The influence of coarse milling on the distribution of the protein fractions in the particles was studied. The profile in proteins was the same for the different classes as that for the whole seed. The second part of the work was devoted to the detn. of the amino acid comp. of the different nitrogenous fractions. AS

OILSEEDS AND NUTS

1866

Rasehorn (H-J), Bartels (B) and Sachse (J). **Technical solutions for the dehulling of oilseeds.** *FAT Science Technology* 93(1): 1991: 35-37 (De)

A new technology for the generation of a sunflower seed kernel-hull-mixture, its fractionation and the hull-separation is discussed. This technology provides a significant reductions of electric power consumption and production area. The major advantages of the SKET-solution and a prospective view of the application for further oilseeds are pointed out. BV

Almonds

1867

Tairu (AO), Omotoso (MA), Oderinde (RA) and Bamiro (FO). **Studies on oxidative stability of crude and processed yellow nutsedge tuber and almond seed oils.** *Journal of Food Science and Technology (India)* 28(1): 1991: 8-11

Crude and partially processed oils of yellow nutsedge and almond were evaluated for their stability towards oxidative deterioration. Crude, processed and illuminated oil samples were withdrawn and active oxygen values determined. Plots of the log of active oxygen values versus heating hours had slopes which reflected the oxidative stabilities of the oils on storage. 'Kaduna-big' and 'Kano' variants of yellow nutsedge showed good stabilities while almond oil showed similar oxidative behaviour in its crude and processed forms. AS

Groundnuts

1868

Galvez (FCF), Resurreccion (AVA) and Koehler (PE). **Optimization of processing of peanut beverage.** *Journal of Sensory Studies* 5(1): 1990: 1-17

Peanut beverages were prepared and homogenized at 2000, 4000, and 6000 psi and processed at 100 C for 10, 15, and 20 min and at 121 C for 5, 10, and 15 min. Sensory analysis, GC analysis, and viscosity measurements were performed on the products. Sulphur aromatic was found sufficient to discriminate between samples processed at 100 C whereas sulphur aromatic, cooked peanut flavour, and bitterness provided the most efficient combination for discriminating between samples processed at 121 C. Processing time had a more significant effect on the sensory attributes of products. Optimum conditions for processing were found to be at homogenization pressure greater than 3100 psi and process time greater than 16 min at a processing temp. of 100 C. No sensory characteristic of the peanut beverage correlated with the instrumental analyses done. AS

Groundnut butter

1869

Dell (MPK), Haswell (SJ), Roch (OG), Coker (RD), Medlock (VFP), Tomlins (K). **Analytical methodology for the determination of aflatoxins in peanut butter: Comparison of high-performance thin-layer chromatographic, enzyme-linked immunosorbent assay and high-performance liquid.chromatographic methods.** *Analyst (London)* 115(11): 1990: 1435-1439

High-performance thin-layer chromatography (HPTLC) was applied to the separation and quantification of aflatoxin in 300 jars of "crunchy" peanut butter. A critical evaluation of the proposed HPTLC method has been carried out by statistical comparisons with a commercially available enzyme-linked immunosorbent assay (ELISA) kit and a high-performance liquid chromatographic (HPLC) method. The statistical test indicated that whilst the distributions of the data sets obtained with each method were similar, the HPLC method was found to be biased. Over-all results indicated that the HPTLC method gave more consistent data, relatively lower standard deviations and lower coeff. of variation. The ELISA kit was found to be less precise than the HPTLC and HPLC methods and prone to some loss of sensitivity caused by matrix interference. AS

Groundnut pastes

1870

Santos (BL) and Resurreccion (AVA). **Effect of particle size on the quality of peanut pastes.** *Journal of Food Quality* 12(2): 1989: 87-97

A spread made from light coloured, bland peanut paste flavoured with cheese, meat, fruit or chocolate would enhance the probability of increased utilization of peanuts. The effect of particle size on quality of pastes prepared from whole peanut kernels subjected to water extraction and chopping was determined. Results indicated that the paste prepared from coarsely or moderately chopped peanuts was found to be light in colour and have the lowest flavour intensity scores. Paste prepared from finely chopped peanuts had the darkest colour among all treatments. AS

Rapeseeds

1871

Booth (EJ), Walker (KC) and Griffiths (DW). **Effect of harvest date and pod position on glucosinolates in oilseed rape (*Brassica napus*).** *Journal of the Science of Food and Agriculture* 53(1): 1990: 43-61

Soybeans

1872

Vassudev (M), Jain (KC) and Satendra (S). **Determination of proximate principles and chromium metal levels in soybean seed with special reference to their size and colour.** *Indian Journal of Nutrition and Dietetics* 27(4): 1991: 124-125

Soybean seeds were grouped into small seeded and black coloured (JS-76-205), and medium seeded and yellow coloured (JS-72-44). The proximate comp., moisture, ash, protein, oil and Cr metal levels were compared. Medium size and yellow coloured seeds contained higher amounts of protein and oil. Cr content was equal in both the var. Moisture and ash % did not differ much in the two groups. GS

1873

Petres (J), Markus (Z), Gelencser (E), Bogar (Z), Gajzago (I), Czukor (B). **Effect of dielectric heat treatment on protein nutritional values and some antinutritional factors in soybean.** *Journal of the Science of Food and Agriculture* 53(1): 1990: 35-41

In 10-cm layers, batches (3 kg) of whole soybean (*Glycine max* l var Evans) seeds at 14.3% moisture levels were dielectrically heated (frequency 27.12 MHz) to 115, 120 and 125 C. Net Protein Utilisation and Net Protein Ratio of soybean proteins were

improved by the treatments as observed in feeding trails in rats. Total lysine contents were slightly affected by the treatments. Trypsin inhibitor (TI), lectin and urease activities were very low and at acceptable levels in dielectrically heated soybean samples. Kunitz inhibitor (KSTI) appears solely responsible for the residual TI activity measured in treated soybean samples. When larger amounts (45 kg in 30-cm layers) of soybean seeds were heated to 120 C by dielectric energy, TI activity was sufficiently inactivated (93%). AS

1874

Sian (NK) and Ishak (S). **Effect of pH on yield, chemical composition, and boiling resistance of soybean protein-lipid film.** *Cereal Foods World* 35(8): 1990: 748-752

The effect of various pHs on soybean protein-lipid film formation yield, chemical comp., and boiling resistance was studied. Film wt. increased as the pH of soy milk rose above its natural pH (6.7). Lowering the pH to 2.0 was found to decrease the film yield. In successive soybean protein-lipid film formations, protein, carbohydrate, ash, and moisture contents increased, while the amount of fat decreased for all the pHs studied (2.0, 6.7, 7.5, 9.0, and 11.0). Films prepared at higher pH (7.5, 9.0, and 11.0) contained more protein, carbohydrate, ash, and moisture but less fat than those prepared at pH 6.7. However, protein and fat contents were lower in films at pH 2.0. Microscopic study showed that fat was less incorporated into the soybean protein-lipid films at higher pH but present as free oil droplets on the surface of the films. Boiling resistance of protein-lipid films decreased as the pH of the soy milk became more acidic (pH 2.0) or alkaline (pH 7.5, 9.0, 11.0) than its natural pH. AS

Soy products

Soy milk

1875

Shivanna (BD), Ramakrishna (M) and Ramadoss (CS). **Enzymic hydrolysis of raffinose and stachyose in soybean milk by α-galactosidase from germinating guar (*Cyamopsis tetragonolobus*).** *Process Biochemistry* 24(6): 1989: 197-199

The possibility of using guar α-galactosidase for the hydrolysis of raffinose and stachyose present in soybean milk which can then be used as a substitute for cow's milk for lactose allergic human subjects is explored. Partially purified preparation of α-galactosidase from two-day o'd germinating guar was used. Max. hydrolysis of raffinose and stachyose occurred was at 45 C and pH 5.0. Chromatographic analysis of the enzyme hydrolysate indicate complete hydrolysis of raffinose and 80% hydrolysis of staatchyose in 30 min. SRA

Soy paneer

1876

Sangeeta Arora and Mital (BK). **Preparation and evaluation of soy paneer.** *Journal of Food Science and Technology (India)* 28(1): 1991: 15-17

Soy paneer was prepared from soy milk and soy milk-skim milk blends and evaluated for chem. and microbiological quality. Skim milk addition to soy milk increased shear strength of the product and thus improved its texture. Use of soy milk - skim milk (80:20) yielded soy paneer with total solids similar to milk paneer. The product had a short shelf-life at ambient temp.; however it could be extended to 7 days by storage at 5 C. The product was found acceptable on consumer preference trails. AS

Soy proteins

1877

Yuryev (VP), Zasypkin (DV), Alexeyev (VV), Genin (YV), Ezernitskaya (MG), Tolstoguzov (VB). **Structure of protein texturates obtained by thermoplastic extrusion.** *Die Nahrung* 34(7): 1990: 607-613

The structure of texturates of moistened proteins (0.33 g water / 1g protein) obtained by thermoplastic extrusion was investigated using X-ray scattering, differential IR-spectroscopy, optical microscopy and mechanical cut testing. Texturates were cooled at the output of the extruder using additional die preventing explosion like evaporation of water. It was shown that textures of individual proteins (ovalbumin and BSA) had amorphous isotropic structure, whereas texturates of soybean protein isolates (SPI) exhibited mechanically anisotropic amorphous structure. The fraction of β-sheet structure in polypeptide chains increased during extrusion process. Besides non-covalent interactions and S-S bonds other covalent bindings are suggested to stabilize texturate structure. The obtained data was used to discuss possible mechanisms leading to the creation of fibrous texturates. AS

Sunflower seeds

1878

Subramanian (R), Shamanthaka Sastry (MC) and Venkateshmurthy (K). **Impact dehulling of**

sunflower seeds: Effect of operating conditions and seed characteristics. *Journal of Food Engineering* 12(2): 1990: 83-94

The effectiveness of dehulling of sunflower seeds was studied as a function of characteristics of the seed (var., size and moisture) and of operating conditions (feed rate and impeller speed). The overall performance was expressed in terms of shelling efficiency and fines production. Var. EC-68415 showed greater shelling efficiency and percent fines than the Morden var. Shelling efficiency and percent fines increased with (i) increase in size of seed, (ii) increase in impeller speed, (iii) decrease in feed rate, and (iv) decrease in the seed moisture content. Equations relating shelling efficiency to moisture content, impeller speed and feed rates for the Morden var. are proposed. AS

TUBERS AND VEGETABLES

Onions

1879

Cessna (A). **Gas chromatographic determination of bromoxynil in onions.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1844-1847

A sensitive GC method is presented to determine bromoxynil residues as methyl ether in onions (*Allium cepa* L.). The method was used to monitor the dissipation of bromoxynil residues in onions over a growing season at 3 sites following 3 postemergence applications at 100 g ha^{-1} to control broad-leaved weeds. Residues on the day of the third application ranged from 288 to 736 µg kg^{-1} for the 3 sites and then decreased to 10-20 µg kg^{-1} during the subsequent 4-5 wks. No residues were detected in the mature bulbs. Recoveries of bromoxynil were 94 plus or minus 10% and 117 plus or minus 10% at the 50 and 10 µg kg^{-1} fortification levels, resp. AS

Beet root

1880

Lisik (K) and Zaorska (H). **Decalcification of sugar thin juice and regeneration of cation exchanger of sodium hydroxide.** *Acta Alimentaria Polonica* 15(3): 1989: 235-242

Decalcification of thin juice in the sodium cycle and regeneration of the cation bed by means of a 4% NaOH, prepared in the previously decalcified thin juice was examined. The eluate, containing NaOH, $Ca(OH)_2$ and KOH can be recycled before the second carbonation, which makes it possible to reduce the pollution of the environment. AS

Carrots

1881

Plat (D), Ben-Shalom (N) and Levi (A). **Changes in pectic substances in carrots during dehydration with and without blanching.** *Food Chemistry* 39(1): 1991: 1-12

Changes in the fractions of the pectic substances in carrots were studied after blanching, dehydration and blanching plus dehydration. The water-soluble pectin and EDTA-soluble pectin fractions were studied after ion-exchange chromatography. A different pattern of uronic acids from the column and a different degree of esterification and neutral sugar comp. indicated significant changes in both pectic fractions, especially in the EDTA-soluble pectin with the appearance of a new large fraction which had not been there previously. The significant decrease in the total percentage of all the pectic substances after dehydration alone, compared with the decrease caused by blanching plus dehydration, led to the conclusion that controlled blanching contributes to reducing the changes in pectic substances. AS

Potatoes

1882

Liu (M-S), Chen (R-Y) and Tsai (M-J). **Effect of low temperature storage, γ-irradiation and iso-propyl-N-(3-chlorophenyl carbamate) treatment on the processing quality of potatoes.** *Journal of the Science of Food and Agriculture* 53(1): 1990: 1-13

1883

Suarez (C) and Viollaz (PE). **Shrinkage effect on drying behaviour of potato slabs.** *Journal of Food Engineering* 13(2): 1991: 103-114

The rate of drying of potato slabs at different initial moisture contents and thickness was investigated. The variation of surface area with time was measured in order to consider the degree of shrinking of the samples during drying. Experimental drying curves were interpreted in terms of Fick's law for shrinking bodies and by means of the classical diffusional model, without shrinking. It was found that for relatively short-drying time Fick's model with shrinking correlates adequately with the experimental results, with a diffusion coeff. independent of moisture content. However, in terms of the classical diffusional model the experimental data predict a strong dependence of the diffusion coeff. on moisture

content. Such dependence was attributed to a shortcoming of the classical 'Fickian' model and not to physical reasons. AS

1884

Boruch (M), Makowski (J), Wachowicz (M) and Dubla (W). **Energy-saving method for obtaining protein from potato juice.** *Acta Alimentaria Polonica* 15(3): 1989: 253-260

Protein was isolated from potato juice by acid-thermal coagulation and by ultrafiltration. The purity of the obtained protein preparations and energy consumption in the two methods were compared. It was found that protein obtained by a concn. of juice by the ultrafiltration method was of higher quality and for its production more than twice less energy was required. AS

Vegetables

1885

Koseoglu (SS), Lawhon (JT) and Lusas (EW). **Vegetable juices produced with membrane technology.** *Food Technology* 45(1): 1991: 124-130

The use of a 'cold' membrane process which combines ultrafiltration and reverse osmosis to process juices extracted from four vegetables (celery, carrots, cucumbers and tomatoes) is discussed. Process combining ultrafiltration and reverse osmosis yields fresh-tasting and clarified juices. BV

1886

Okoli (CAN) and Erinle (ID). **Comparative rate of rot-induction by nine fungal pathogens on stored tomato fruits in Nigeria.** *Journal of Stored Products Research* 26(2): 1990: 77-79

The rate of rot-induction by 9 of the most important fungal pathogens responsible for field and storage rots of tomato in the Nigerian Guinea Savanna, was compared in the lab. The pathogens were, *Furarium equiseti*, *F. oxysporum*, *F. chlamydosporium*, *Exserohilum rostratum*, *Rhizopus stolonifer*, *Colletotrichum capsici* and *Aspergillus niger*. There was a very highly significant difference (P = 0.001) in the rate of induction of rot by the different fungi *R. stolonifer* induced rots faster than all the other fungi, while *E. rostratum* and *C. lunata* were the slowest in inducing rots. The control fruits remained healthy for most of the 10-day trial period. It was concluded that the virulence of the infecting pathogen is a factor determining the shelf-life of tomato fruits. AS

1887

Samaniego-Esguerra (CM), Boag (IF) and Robertson (GL). **Comparison of regression methods for fitting the GAB model to the moisture isotherms of some dried fruit and vegetables.** *Journal of Food Engineering* 13(2): 1991: 115-133

The moisture sorption isotherms for dried onions, green beans and apricots were determined at 20, 30 and 40 C using the proximity equilibration cell method. Three regression methods were used to fit the GAB (Guggenheim-Anderson-de Boer) model to the experimental results. The direct nonlinear weighted regression analysis was shown to be the preferred procedure for estimating the 6 constants of the GAB model and predicting the moisture sorption isotherms of the dried products over the temp. range tested. AS

1888

Wolfe (DW), Bache (CA) and Lisk (DJ). **Analysis of dithiocarbamate and nickel residues in lettuce and peppers grown in soil containing photodegradable plastic mulch.** *Journal of Food Safety* 10(4): 1990: 281-286

Photodegradable plastic which contains nickel and dithiocarbamates active ingredients controls weeds and conserves moisture during the growth of vegetables after which it may be sowed into the soil to decompose. Dithiocarbamate residues were not detectable on harvested crop or soil samples. Residues of nickel showed no consistent differences between treated or control crop and soil samples. KMA

Bitter gourd

1889

Siva Kumar (S), Kalra (R) and Nirankar Nath. **Dehydration of bitter gourd (*Momordica charantia* Linn.) rings.** *Journal of Food Science and Technology (India)* 28(1): 1991: 52-53

Catalase was the most heat resistant enzyme in bitter gourds. Blanching 1 cm thick rings for 2 min in boiling water inactivated all the enzymes present in rings. Blanching rings in 5% NaCl and drying them in a tray drier for 3 h at 70 C followed by 4 h drying at 60 C gave dark green, soft textured, slightly salty and less bitter product. AS

Alfalfa

1890

Oleszek (W), Price (KR), Colquhoun (IJ), Jurzysta (M), Ploszynski (M), Fenwick (GR). **Isolation and identification of alfalfa (*Medicago sativa* L.) root saponins: Their activity in relation to a fungal bioassay.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1810-1817

Nine triterpene glycosides have been isolated from alfalfa (*Medicago sativa*) roots and their structures elucidated by using chromatographic, chem., and spectroscopic techniques. Six of these saponins were identified as being glycosides of medicagenic acid, 2 of hederagenin, and one of soyasapogenol B. The compounds containing medicagenic acid could be further subdivided into analogues of either 3-*O*-glucoside or 3-*O*-glucuronide of medicagenic acid. The presence of the latter group has been previously reported. Activity against the fungus *Trichoderma viride* has been determined for each of the saponins, and their structure-activity relationship is discussed with regard to a fungal bioassay routinely used for saponin detn. AS

Tomatoes

1891

Porretta (S) and Sandei (L). **Determination of 5-(hydroxymethyl)-2-furfural (HMF) in tomato products: Proposal of rapid HPLC method and its comparison with the colorimetric method.** *Food Chemistry* 39(1): 1991: 51-57

The proposed method includes analysis of the serum obtained after suitable sample dilution and Carrez addition followed by 12000 r.p.m centrifuging for 2 h by HPLC, using a reverse-phase C18 column and an ultraviolet detector operating at 285 nm in isocratic elution with 90:10 water-methanol. Juice and paste (double and triple) samples have been analysed by means of two methods (Winkler and HPLC) and statistical analysis, carried out on the results, clearly shows a difference between them. In particular, the colorimetric method which includes no centrifuging, but only filtration, almost always yields results which are lower than the HPLC ones. AS

FRUITS

1892

Karovicovà (J), Polonsky (J) and Pribela (A). **Composition of organic acids of *Sambucus nigra* and *Sambucus edulus*.** *Die Nahrung* 34(7): 1990: 665-667

In this paper the comp. and concn. of organic acids in fruits of *Sam. nigra* and *Sam. edulus*, determined by capillary isotachophoresis, are presented. BV

1893

Carbonell (E), Costell (E) and Duran (L). **Rheological behaviour of fruit products. Flow, time dependence and plasticity.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 189-209 (Es)

Because of differences in both comp. and structure, fruit products, such as juices, nectars, conc., purees, show a wide range of rheological behaviours. Their characterization is not always easy and often requires the use of different techniques. In this review, the presently available methods for characterizing the rheological behaviour of fruit products in isothermal conditions, are analysed and discussed. The following aspects are studied separately: flow behaviour, time dependence, and plasticity. AS

Apples

1894

Saks (Y), Sonego (L) and Ben-Arie (R). **Senescent breakdown of 'Jonathan' apples in relation to the water-soluble calcium content of the fruit pulp before and after storage.** *Journal of the American Society for Horticultural Science* 115(4): 1990: 615-618

In 'Jonathan' apples grown in Israel, the incidence of senescent breakdown after 5 months of storage at 0 C was not correlated with total or water-soluble Ca content at harvest. Likewise, no other assayed component of the water-soluble or total mineral content (P, Mg, K) of the fruit pulp at harvest correlated with the disorder after storage. After storage, a general decrease in the solubility of Ca was observed. However, this decrease was not uniform in all fruit and, as a result, the correlation between water-soluble and total Ca content, which was high at harvest, diminished after storage. Water-extractable Ca from stored fruit was negatively correlated and water-soluble K/Ca was positively correlated with the incidence of senescent breakdown, whereas total Ca was not correlated. AS

1895

Gutenmann (WH), Lisk (DJ) and Blanpied (GD). **Diphenylamine residues in apples and apple cider.** *Journal of Food Safety* 10(4): 1990: 277-279

Diphenylamine (DPA) is used as a antioxidant on apples for scald control during storage. Pomace and cider were analysed for DPA. All DPA was found in pomace and none in cider indicating that DPA is accumulated in pomace since it is fat soluble. KMA

1896

Olsen (KL), Hungate (FP), Drake (SR) and Eakin (DE). **'Red Delicious' apple response to low-dose radiation.** *Journal of Food Quality* 12(2): 1989: 107-113

'Red Delicious' apples were tested for response to irradiation at levels (0 to 1.0 KGy) sufficient for quarantine treatment, delivered up to 10 months post-harvest. Treatment regimes simulated marketing sequences including a 60 day holding period following removal from controlled atm. storage. Irradiated apples were softer and had less acid, but there was a retardation of the hydrolysis of starch. Irradiation effects were not accentuated with longer storage or during ripening. After 11 months of storage all the apples in this study were 6.7 (N) firmer than the Washington State export standard. The quality of all treated fruit were acceptable for marketing. AS

Apricots

1897

Berna (A), Rossello (C), Pou (J), Mulet (A) and Canellas (J). **Food dehydration with solar energy. II. Exploratory tests with apricots.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 219-229 (Es)

A solar convection pilot dryer of the mixed type for fruits and vegetables, was used for the drying of apricots. The influence of several variables (tray dimensions, direct solar radiation and operation cycle) on the process were examined, and results compared with open sun drying. The results proved the great influence of air velocity on the drying rate of apricots. Temp. seems to have less importance in the experimental conditions examined. A simulation of a continuous conveyor belt dryer was carried out. Drying under these conditions increased and proved to be more convenient than open sun drying. The observed drying kinetics in the pilot scale agrees with literature results at lab. scale at 70 C and 300-1000 kg/m^2h air flow. AS

Babaco

1898

Castaldo (D), Palmieri (L), Lo Voi (A) and Costabile (P). **Flow properties of babaco (*Carica pentagona*) purees and concentrates.** *Journal of Texture Studies* 21(3): 1990: 253-264

A power law model describes adequately the rheological behaviour of Babaco purees and conc. while a Herschel-Bulkley model describes conc. only. A single equation $n_a = \alpha \times c\beta \times \exp(E_a/RT)$, combining the effects of temp. and concn. on apparent viscosity (n_{a100}), was used to describe rheological behaviour. AS

Bananas

1899

Nussinovitch (A), Kopelman (IJ) and Mizrahi (S). **Mechanical criteria of banana ripening.** *Journal of the Science of Food and Agriculture* 53(1): 1990: 63-71

Mechanical parameters have been evaluated as criteria suitable for following the progress of ripening of drawf Cavendish bananas and for predicting the rate of the process from the data obtained at the initial stage. Three criteria have been found to be particularly suitable for that purpose and to give a very high and significant correlation coeff. ($P < 0.01$) with parameters such as degree Brix, starch content, water content, time and colour index. The 3 criteria are: the strain at a stress of 0.01 MPa; the ratio of stress at 0.05 strain to that at failure; and the ratio of the deformability modulus at small (2.0) to that at failure. AS

Grapes

1900

Ricardo da Silva (JM), Rosec (J-P), Bourzeix (M) and Heredia (N). **Separation and quantitative determination of grape and wine procyanidins by high performance reversed phase liquid chromatography.** *Journal of the Science of Food and Agriculture* 53(1): 1990: 85-92

A method is described for the separation and quantitative analysis of procyanidins in grape and wine. On a polyamide chromatographic column an initial elution with water at pH 7.0 enabled elimination of interfering phenolic acids. A second elution with acetonitrile/water (30:70 v) was performed to extract catechins. A third elution with acetone/water (75:25 v) was carried out to obtain procyanidins. The quantitative detn. of procyanidins was done by high performance reversed phase liquid chromatography. The HPLC analysis was brought down to ~55 min. The method is accurate and reproducible and has an acceptable extraction efficiency. AS

1901

Xirau-Vayreda (M) and Ruhi-Brunso (N). **Determination of carbendazim residues in grapes and wines of El penedes (Catalonia, Spain).** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 272-276 (Es)

Mangoes

1902

Vijay Sethi. **Preservation of raw mango slices (var. Neelum) for use in pickle and chutney.** *Journal of Food Science and Technology (India)* 28(1): 1991: 54-56

Steeping preservation in a chem. solution containing 5% salt, 1.2% acetic acid and 0.1% KMS was found to be the best followed by 3% salt, 0.8% acetic acid and 0.2% KMS than by dry salting. Addition of 0.5% calcium chloride helped to retain texture of slices during subsequent storage. Dry salting showed more softening and browning of slices. AS

Oranges

1903

Ke (D) and Kader (AA). **Tolerance of 'Valencia' oranges to controlled atmospheres as determined by physiological responses and quality attributes.** *Journal of the American Society for Horticultural Science* 115(5): 1990: 779-783

'Valencia' oranges [*Citrus sinensis* (L.) Osbeck] tolerated up to 20 days of exposure to 0.5, 0.25 or 0.02% O_2 at 5 or 10 C followed by holding in air at 5 C for 7 days without any detrimental effects on external and internal appearance. Oranges stored in 0.5, 0.25 or 0.02% O_2 had lower respiration rates, but higher resistance to CO_2 diffusion and higher ethanol evolution rates than those stored in air at 10 C. Similar, but less pronounced, effects of the low O_2 atmospheres were observed at 0 and 5 C. Respiration rates, internal CO_2 concn., and ethanol evolution rates were generally higher at 10 C than at 0 C, while resistance to CO_2 diffusion was lower at the higher temp. 'Valencia' oranges kept in 60% CO_2 at 5 C for 5 to 14 days followed by holding in air at 5 C for 7 days developed slight to severe injury that was characterised by skin browning and lowered external appearance scores. Juice colour, soluble solids content, pH, titratable acidity, and ascorbic acid content were not significantly influenced by either the low O_2 or the high CO_2 treatments. However, these treatments increased ethanol and acetaldehyde contents, which correlated with the decrease in flavour score of the fruits. Ethanol content of the oranges transferred to air following low O_2 treatment correlated with CO_2 production rate of the fruits at the transfer temp. and was related to ethanol evolution and probably production rates after the transfer. AS

Papayas

1904

Paull (RE) and Chen (NJ). **Heat shock response in field-grown, ripening papaya fruit.** *Journal of the American Society for Horticultural Science* 115(4): 1990: 623-631

The response of ripening field grown papaya fruit to short term heat-treatment at various temp. was studied. The variation in fruit sensitivity to heat treatments during the yr and the conditions necessary to produce max. induced thermotolerance were determined. Details about experimental methods were given. BAP

Pomegranates

1905

El-Nemr (SE), Ismail (IA) and Ragab (M). **Chemical composition of juice and seeds of pomegranate fruit.** *Die Nahrung* 34(7): 1990: 601-606

The edible parts of pomegranate fruit represented 52% of total fruit wt., comprising 78% juice and 22% seeds. The fresh juice contained 85.4% moisture, 10.6% total sugars, 1.4% pectin, 0.1 g/100 ml total acidity (as citric acid), 0.7 mg/100 ml ascorbic acid, 19.6 mg/100 ml free amino N and 0.05 g/100 ml ash. Meanwhile, the seeds are a rich source of total lipids, protein, crude fibers and ash representing 27.2, 13.2, 35.3 and 2.0% resp., and also contained 6.0% pectin and 4.7% total sugars. The Fe, Cu, Na, Mg, and Zn contents of the juice were lower than those of seeds, except K which was 49.2 p. p .m in the juice. On the other hand, the physical and chemical properties of seed's lipids indicated that the refractive index was 1.518, melting point 13.0 C, iodine value 74.2, acid number 1.1, unsaponifiable matters 0.7%, saponification value 188.9, ester value 187.8 and glycerol content 10.3%. Moreover, the studied lipids contained 11 fatty acids, from them caprylic, the predominant acid, represented 36.3%, followed by stearic acid (22.5%). Furthermore, oleic and linoleic acids covered 5.1% and 10.3%, resp. Otherwise, the saturated fatty acids of seed's lipids of pomegranate composed 83.6% of the total fatty acids content. AS

Strawberries

1906

Cheour (F), Willemot (C), Arul (J), Desjardins (Y), Makhlouf (J), Charest (PM), Gosselin (A). **Foliar application of calcium chloride delays postharvest ripening of strawberry.** *Journal of the American Society for Horticultural Science* 115(5): 1990: 789-792

Effects of $CaCl_2$ preharvest treatment on postharvest strawberry (*Fragaria x ananassa*)

ripening and gray mold development were assessed. Two experiments were carried out in 1987 on two sites. In the first experiment, the effects of rate of application of $CaCl_2$ and degree of fruit maturity at treatment were studied with the conventional cv Kent. In the second experiment, the influence of concn. and frequency of application of $CaCl_2$ was investigated with day-neutral 'Tribute'. Ca treatment caused a significant increase in fruit and leaf Ca contents, which were closely correlated. The degree of fruit maturity at application and the frequency of treatment did not affect Ca concn. in the tissues. Several maturity criteria were measured during fruit storage in air at 4 C. Anthocyanin and free-sugar contents and tissue electrical conductivity increased, while titratable acidity and firmness decreased. In both experiments, Ca treatment delayed ripening and gray mold development. The delay increased with increasing Ca concn. AS

Tangerines

1907

Cohen (E), Shalom (Y) and Rosenberger (I). **Postharvest ethanol buildup and off-flavour in 'Murcott' tangerine fruits.** *Journal of the American Society for Horticultural Science* 115(5): 1990: 775-778

Britex and Zivdar, water-based polyethylene waxes, were applied in commercial and experimental formulations as spray coating, a single dip, or double dips on 'Murcott' tangerine (*Citrus reticulata* Blanco) fruits. Postharvest waxing of 'Murcott' tangerine reduced wt. loss but affected the sensory characteristics of the fruit. Changes in fruit wt. loss and juice comp. occurred in the waxed fruits after 4 wks of storage at 5 C plus 1 wk of simulated retail handling at 17 C. Changes in internal fruit atm. were related to fruit flavour quality. AS

CONFECTIONERY, STARCH AND SUGAR

Starch

1908

Dolan (KD) and Steffe (JF). **Modeling rheological behaviour of gelatinizing starch solutions using mixer viscometry data.** *Journal of Texture Studies* 21(3): 1990: 265-294

A Brookfield RVTD mixer viscometer was used to gelatinize 5.5, 6.4 and 7.3% (d.b.) native corn starch solutions, and a 6% bean starch solution. Torque, the dependent variable, was used to estimate parameters in a generalised viscosity model. The independent variables were impeller speed, temp. (50-95 C), concn., temp.-time history, and strain history. The starch dispersions thickened with decreasing temp. and had an Arrhenius activation energy between 6.4 and 12.7 kJ/mol. There was no evidence that retrogradation caused this effect. First-order reaction kinetics was accurate (9.8% standard deviation) in describing viscosity increase during gelatinization. After initial gelatinization, torque decayed exponentially with time. Predicted curves followed experimental pasting curves when interactions among the independent variables were accounted for in the model. The major variables controlling the pasting process were temp.-time history before peak torque, strain history between peak torque and cooling, and temp. during cooling. AS

1909

Drouzas (AE), Maroulis (ZB), Karathanos (VT) and Saravacos (GD). **Direct and indirect determination of the effective thermal diffusivity of granular starch.** *Journal of Food Engineering* 13(2): 1991: 91-101

The effective thermal diffusivity (α_{eff}) of two granular starches was determined directly and indirectly, using the heated probe method of unsteady-state heat conduction. In the direct method, α eff was determined from transient time-temp. data, obtained with a thermocouple placed neat the heated line source. In the indirect method, α_{eff} was calculated from the effective thermal conductivity (λ_{eff}), the bulk density (p_b), and the specific heat (C_p) of the granular starch in the moisture range 0-30% (dry basis) and at $p_b = 700$ kg/m^3, T = 25 C. The specific heat of the starches, determined by differential scanning calorimetry, increased linearly from 1260 to 1800 kJ/kg K in the moisture range 0-30% (dry basis). The indirect method yielded more accurate values of α_{eff} (near 1×10^{-7} m^2/s) than the direct measurement, as concluded from the F-test at level of significance 5%. AS

1910

Lorenz (K). **Quinoa (*Chenopodium quinoa*) starch - physicochemical properties and functional characteristics.** *Starch/Starke* 42(3): 1990: 81-86

Starch was isolated from quinoa for a study of physico-chemical properties, functional characteristics and a comparison with starches from wheat, barley, wild rice, amaranth and potatoes. Quinoa starch granules range in size from 0.6 to 2.0 μm and are found within the cells of the seed as single entities or as compound structures of spherical or oblong aggregates. Quinoa starch exhibited a higher amylograph viscosity, a greater water binding capacity and a greater swelling power

compared to wheat- or barley starch. The gelatinization temp. range of quinoa starch was slightly higher than that of wheat- or barley starch. Amylose content was lower. As a thickening agent for fillings, quinoa starch performed better than other starches in the study. However, breads and cakes baked with quinoa starch were of poor quality. Volumes were lower, the grain non-uniform with thick cell walls and the texture dense and compact. The overall performance of quinoa starch in baked goods was similar to that of other non-cereal starches (amaranth- and potato starch). AS

1911

Deffenbaugh (LB) and Walker (CE). **Use of the rapid visco-analyzer to measure starch-pasting properties. Part. II. Effects of emulsifiers and sugar-emulsifier interactions.** *Starch/Starke* 42(3): 1990; 89-95

The rapid visco-analyzer (RVA) was used to study the effects of sucrose ester (SE) emulsifiers and a propylene glycol ester (PGE) emulsifier on starch cooking properties. Maize, tapioca and wheat starches were affected to different degrees by F-160 SE with a hydrophil-lipophil balance (HLB) of 15. Up to a concn. of 0.05 parts emulsifier to 1 part starch, the F-160 SE increased peak viscosity, time to peak and max. setback viscosity of the starches. These data suggested that the SE functioned by forming a clthrate complex with the starch mol. When cooking properties of maize starch were studied in the presence of SEs with HLB 6, 11, and 15, the effects of the SE did not appear to be directly related to wheat starch, as indicated by a decrease in peak viscosity and time to peak. Cooking properties of the starches were also measured in the presence of sugars (dextrose, sucrose, corn syrup solids and polydextrose) at a level of 2 parts sugar to 1 part starch, plus emulsifiers at a ratio of 0.02:1. Peak viscosity, time to peak and max. setback viscosity were affected synergistically in the presence of boty sugar and emulsifier as compared to additive effects of the two ingredients acting alone. Although reaction mechanisms could not be defined from the data obtained, the RVA proved useful for quickly demonstrating the effects of multiple ingredients on starch cooking properties. AS

Sugars

1912

Sen (KK), Reddy (SS) and Sen (SK). **Sugars from jute stick.** *Research and Industry, India* 35(2): 1990; 94-95

Jute stick (agricultural waste) has been evaluated for sugar production. First it was crushed into 40-60 mesh size and extracted with alcohol-benzene (1:2) for 10 h. The defatted stick was acid hydrolysed, neutralised, concentrated on a rotary evaporator and reduced to alditol with $NaBH_4$ and analysed by GLC. Monosaccharin isolated on GLC are glucose and xylose and others are found in trace amounts. The max. amount of glucose and xylose under optimum conditions is found to be 41.4% and 16.9% resp. for untreated jute stick. The optimum conditions for acidic hydrolysis of jute stick are acid strength of 72% H_2SO_4; solid liquid ratio of 1:4; soaking temp. of 40 C; and soaking time of 30 min. The yield of reducing sugars from untreated jute stick is 59.8% and from delignified jute stick is 64.7%. GS

1913

Ollett (A-L) and Parker (R). **The viscosity of supercooled fructose and its glass transition temperature.** *Journal of Texture Studies* 21(3): 1990; 355-362

The viscosities of supercooled liquid fructose and glucose are measured between a lower viscosity limit corresponding to 95 C and an upper limit of about 10^6 Pa.s. The glass transition temp. of fructose is estimated from the viscosity data using different extrapolation procedures. The Vogel-Tamman-Fulcher and power-law equations gave estimates of 283K and 289K resp. and the Williams-Landel-Ferry equation 286K. These values are in agreement with recent calorimetric detn. of the glass transition temp. AS

Fructose

1914

Gehlawat (JK). **High fructose syrups as a substitutive for sugar.** *Journal of Scientific and Industrial Research* 50(4): 1991; 289-300

The author first reviews the sugar production situation of India where the demand for sugar exceeds the supply. The solution for the sugar crisis as it exists in India is improving the performance of existing mills or finding out alternate sweeteners. High fructose syrup from starch has good potential under Indian situation. The author reviews the scope for the use of HFS in food preparation in India, production methodology, raw materials suitable for HFS production; The process suitable for the starch complex and the project cost. 56 references. SRA

Jaggery

1915

Verma (VK) and Maharaj Narain. **Moisture absorption isotherms of jaggery.** *Journal of Stored Products Research* 26(2): 1990; 61-66

Equilibrium moisture contents of jaggery were determined for the absorption process at 293, 303, 313 and 323 K and at 6 levels of RH (approx. 30, 45, 60, 75, 80 and 90%) using a static desiccator technique. The equilibrium moisture content increased with an increase in temp. as well as RH. Hygroscopicity of jaggery increased with temp. and absorption isotherms were sigmoidal in shape. 6, two-parameter isotherm equations were examined for their applicability to the experimental data. Out of these, Smith's equation gave the best fit. The constants of Smith's equation were found to be temp. dependent, the dependence being described by an Arrhenius type relationship. Isosteric heat for the absorption process ranged from 36.65×10^{3} to 49.79×10^{3} kJ/kmol K. AS

Sugarcane juices

1916

Kulkarni (VR), Londhe (MB), Bhosale (RN), Chavan (SM), Bhongle (RP), Jadhav (SY). **Optimisation of lime dose for cane juice clarification by liming and sulphitation method.** *Indian Sugar* 41(3): 1991: 161-167

The aim of cane juice clarification is to remove max. possible impurities to produce better end product. A definite shock lime pH should be maintained to remove these impurities. For detn. of this shock lime pH value, lab. experiments were carried out in sugar factories. About 10 l of mixed juice composite collected was used for different lime dose study. Phosphate level in mixed juice was adjusted to 300 p.p.m. P_2O_5, heated to 67-70 C for 3 min, with constant stirring the pre-measured milk of lime was added, neutralisation of shock lime juice was done with SO_2 upto 7.1-7.2 pH. This sulphite juice was heated to boiling, and mud vol. was recorded in a flask at intervals. This procedure was repeated to milk of lime dose from 1.0 to 3.5% v/v. The shock lime juice pH was noted of every treatment. The mixed juice and clear juice were analysed for Brix, % purity, P_2O_5 content, CaO content, conductivity, ash, starch and dextran contents and viscosity at room temp. The optimum lime dose varied from factory to factory. The optimum shock lime juice pH was 9.5 to 10.5 corresponding to the milk of lime dose of 2.0 to 3.0 v/v. To attain this optimum lime dose the lime comsumption was calculated to be about 0.18 to 0.22%. This indicates that present trend of reduction in the lime consumption is not encouraging which may have effect on end product quality. SRA

BAKERY PRODUCTS

1917

Arya (SS). **Grain based snack and convenience foods. Part II.** *Indian Miller* 21(5): 1991: 7-16

Information on the traditional method of preparation, packaging, shelf-life and improved technologies developed of the following Indian sweets, snacks, confectionery items and cookies have been described: sweets include laddu, boondi, jilebi, imrati, jhangiri, Mysore pak, besan burfi and firni, chiroti, sohan papri and halwa: snacks like chikki, gajjak, and papads. Several convenience foods developed and the processing methodology and packaging aspects have been reviewed. Other aspects dealt with include ready-to-eat products stabilised with antimycotic agents, retort pouch foods, canned convenience foods and breakfast cereals which include dalia, rolled oats, and cereal flakes. SRA

1918

Tieckelmann (RE) and Steele (RE). **Higher-assay grade of calcium peroxide improves properties of dough.** *Food Technology* 45(1): 1991: 106-108, 112

The use of calcium peroxide as a dough conditioner strengthens gluten wall in dough for better texture, moisture retention and yield. A brief history of its use, its functions and advantages are discussed in this article. BV

1919

Bramesco (NP) and Setser (CS). **Application of sensory texture profiling to baked products: Some considerations for evaluation, definition of parameters and reference products.** *Journal of Texture Studies* 21(3): 1990: 235-251

Parameter definitions and reference scales of the sensory texture profiling method were examined in relation to the textural descriptions of baked products. The following textural terms were found to be pertinent to baked goods, especially to layer cakes: firmness, springiness, adhesiveness (to lip, palate, teeth), crumbliness/self-adhesiveness, moistness, cohesiveness/deformation moisture sorption and cohesiveness of mass. Applicable definitions were selected, and reference products representing low and high levels of these characteristics were identified. Preliminary information was obtained suggesting that the panelists' salivary flow rate and the timing of the evaluation in relation to the residence time in the mouth could be critical factors for achieving consistent responses. AS

Bread

1920
Syed (HM), Rathi (SD), Sewate (AR) and Taur (AT). **Studies on breadmaking potential.** *Indian Miller* 21(5): 1991: 25-29

Bread quality from wheat var. HD 2189 and N-59 were studied. The whole meal and white flour (maida) of the two var. were compared with excellent breadmaking quality of a commercial flour. Results indicate that the dough handling properties of HD 2189 and N-59 whole meal doughs were sticky and maida doughs were normal. During sheeting and moulding whole meal doughs were slightly sticky. Wheat flour doughs and commercial flour doughs were normal for handling during entire process of breadmaking. HD 2189 and N-59 were just satisfactory for breadmaking, but could not give good quality bread. The bread obtained from commercial, N-59 and HD 2189 flours were softer than whole meal breads of N-59 and HD 2189. It was observed that 22.22-32.05% phytic P could be hydrolysed during fermentation of bread dough. As such 3 times lesser phytic P was observed in maida as compared to whole meal. SRA

Cakes

1921
White (DC) and Lauer (GN). **Predicting gelatinization temperatures of starch/sweetener systems for cake formulation by differential scanning calorimetry. I. Development of a model.** *Cereal Foods World* 35(8): 1990: 728-731

1922
Horton (SD), Lauer (GN) and White (JS). **Predicting gelatinization temperatures of starch/sweetener systems for cake formulation by differential scanning calorimetry. II. Evaluation and application of a model.** *Cereal Foods World* 35(8): 1990: 734-739

Pies

1923
Darweesh (LL), Toma (RB) and Lee (HC). **Chemical and sensory evaluation of lipid blends used in pie crusts.** *Food Chemistry* 39(1): 1991: 87-98

Blends of lipids were used in pie crust baking to replace lard, which is widely used by industry. Blends prepared were 20% butter/80% margarine, 40% butter/60% margarine, 20% butter/80% shortenings and 40% butter/60% shortenings. Blends were tested for colour, iodine value, solid fat index (SFI), melting point, fatty acids profile and peroxide values for 5 wks storage period. Difference and preference tests for pie crusts were determined. Results showed that lard as a standard had a wider range of SFI, lower iodine value and higher saturated fatty acids profile than all blends. Neither lard nor any of the blends attained high enough peroxide values to be rejected. The blend of 20% butter/80% shortening was the most acceptable blend to replace lard in pie crust baking. AS

MILK AND DAIRY PRODUCTS

1924
Padmanabha Reddy (V) and Mathur (BN). **UHT processing of particulate foods.** *Indian Dairyman* 43(6): 1991: 270-275

UHT processing of particulate foods has been reviewed. The authors briefly review aspects like heat transfer profiles in particulate foods and sterility estimation. Mathematical models have been developed for shelf-life prediction which will serve as useful tools for quality assurance programme. Commercial systems for promoting aseptic processing of particulate foods like scraped surface heat exchangers, patricon processor, APV jupiter system, multitherm process using microwaves, Ohmic heating system and viscolab process have been briefly described. 8 references. SRA

1925
Banerjee (AK). **Problems of dairying in India in the nineties.** *Indian Dairyman* 43(7): 1991: 293-305

The author gives an estimate of the pressure of human and cattle population on the land in India in the nineties and the contribution of buffalo to milk production in India. He also reviews the seasonal and regional variations in milk production in India and its effect on farmers. It is advocated that high milk yielding cows should be bred and the new technologies developed to enrich crop residues should be applied on large scale to overcome the shortage of nutritious feeds. Stress is also placed on marketing of milk and estimate is given about the likely demand for milk in major towns and the share of milk marketed by different systems. The author indicates the need for modernization of dairy plant, processing, product manufacturing and packaging to face the challenge of nineties. 7 references. SRA

1926
Holsinger (VH) and Kligerman (AE). **Applications of lactase in dairy foods and other foods containing lactose.** *Food Technology* 45(1): 1991: 92-95

1927

Hsih (KT), Toba (T) and Adachi (S). **Oligosaccharide structures formed during acid hydrolysis of lactose.** *Food Chemistry* 39(1): 1991: 39-49

At least 17 disaccharides and 4 anhydrosugars were formed during hydrolysis of 30% lactose with 2 *M* HCl at 100 C for 16 h. The structure elucidation of 11 disaccharides and an anhydrosugar was carried out by methylation analysis, mass spectrometry, enzymatic digestion and ^{13}C-NMR spectrometry. The disaccharides were 4-O-β-D-glucopyranosyl-D-galactose, 3-O-β-D-glucopyranosyl-D-galactose, 2-O-α-D-galactopyranosyl-D-glucose, 6-O-α-D-glucopyranosyl-D-glucose (isomaltose), 6-O-β-D-glucopyranosyl-D-glucose (gentiobiose), α-D-galactopyranosyl-(1-1)-α-D-glactopyranosyl-D-galactose, 6-O-β-D-glucopyranosyl-D-galactose, 6-O-α-D-glactopyranosyl-D-galactose and 6-O-β-D-galactopyranosyl-D-galactose. The anhydrosugar was 1,6-anhydro-β-D-anhydro-β-D-glactopyranose (levogalactosan). AS

1928

Baker (G). **Texture and stabilisation of reduced energy dairy foods.** *Food Australia* 42(11): 1990: 528-530

The raw materials required and procedures to be followed in the production of a reduced energy frozen dairy dessert is discussed in this paper. The flavour, texture and stability of frozen dairy desserts can be successfully emulated with an ice cream like frozen dessert which provides 35% less energy per serving than a standard ice cream. BV

1929

Vasavada (PC). **Microwave processing for the dairy industry.** *Food Australia* 42(12): 1990: 562-564

This review discusses various aspects like microwave characteristics, mechanism of microwave heating, microbial lethality, dairy industry applications and designing a microwave process. 21 references. SRA

1930

Muir (DD). **Lactose.** *Journal of the Society of Dairy Technology* 43(2): 1990: 33-34

Structure, properties, manufacture, uses, reaction, hydrolysis and nutritional aspects of the lactose are briefly described. JSS

1931

Vinson (HG). **Hygienic design of a dairy.** *Journal of the Society of Dairy Technology* 43(2): 1990: 39-41

The engineering aspects of hygienic handling of milk and milk products has been discussed. Starting form selection of a site, segregation of clean and dirty areas and also raw materials and finished products, mechanical design of the plant ventilation, compressed air, water quality, electrical installation, service platform, vacuum cleaner, operational requirements are also discussed. JSS

1932

Cordier (JL). **Quality assurance and quality monitoring of UHT processed foods.** *Journal of the Society of Dairy Technology* 43(2): 1990: 42-45

A brief overview of the quality of UHT processed foods is given, covering sampling plans and analytical procedures applied to verify the quality of incubated packs. Quality assurance based on the Hazard Analysis Critical Control Point System is briefly covered. Different aspects such as installation, cleaning and sterilization, starting from the raw materials and ending with the distribution of the finished products are discussed. BV

Milk

1933

Salooja (MF), Rao (DV) and Sankhla (AK). **New approaches in the UHT processing of milk.** *Indian Dairyman* 43(7): 1991: 306-311

The author points out that in tropical climate it is advantageous to use direct free falling system. This process is a continuous flow system of sterilization followed by aseptic packaging. In this process the milk is heated in a plate heat exchanger to 66-71 C and sent into the infusion chamber saturated with steam at 145 C where the milk is fed through horizontal pipes slotted underside. The milk only comes in contact with hot metal surface in the chamber, which is precooled a little so that the holding temp. is slightly lower than the sterilization temp. Further the milk enters into a tubular holding cell with a holding time of 3 s and then flows into the vacuum flash cooler where the milk is cooled to 66 C. Finally milk is pumped by an aseptic uniflow-pump through an aseptic homogenizer, an aseptic plate heat exchanger and ends at an aseptic accumulation tank. The heat shock treatment gives a high sterilizing effect with little damage to the physical, chem. and nutritional qualities of the product. SRA

1934

Malhan (RS) and Jain (DK). **Seasonal and spatial variation in milk and ghee prices in Haryana.** *Indian Journal of Dairy Science* 42(4): 1989; 684-688

1935

Kaur (M) and Gill (GS). **Milk production, consumption and disposal pattern in the rural areas of Ludhiana district (Punjab).** *Indian Journal of Dairy Science* 42(4): 1989; 689-693

1936

Dodeja (AK), Sarma (SC) and Abichandani (H). **Development of thin film scraped surface heat exchanger for UHT processing of milk.** *Indian Journal of Dairy Science* 42(4): 1989; 760-764

A cascade thin film scraped surface heat exchanger consisting of sterilizer, regenerator and cooler was designed and fabricated for ultra high temp. (UHT) processing of milk. The efficacy of experimental set-up was evaluated in terms of sterilizing effect (Fo) for holding period of 0.25, 1.00 and 1.25 s. The processing temp. used were 143, 145, 150 and 152 C. A max. Fo value of 15 min and 17 s was obtained at 152 C for holding time of 1.25 s. This value is enough to obtain satisfactory sterilized milk. AS

1937

Moti Ram and Joshi (VK). **Effect of addition of proteose-peptone components -3, -5 and -8 on inhibition of lipolysis in buffalo milk.** *Indian Journal of Dairy Science* 42(4): 1989: 771-774

The effect of proteose-peptone (PP) components from buffalo milk in controlling lipolysis in milk is reported. Buffalo milk proteose and its PP components -3, -5 and -8 inhibited lipolysis in buffalo as well as in cow milk upto 72 h of storage at 4-6 C. Max. inhibition occurred at a 1.5 mg/ml concn. of the individually added PP components. Component -3 was a more effective inhibitor (71.6%) than component -5 of component -8 (48.2%). AS

1938

Thangavel (K) and Das (H). **Studies on conical surface evaporator for concentrating milk.** *Indian Journal of Dairy Science* 42(4): 1989; 797-803

Heat transfer coeff. of conical surface evaporator in sensible heating and boiling liquids were investigated. 3 cones developed using 4 mm thick Al sheet having cone angles of 20, 25 and 31.2 degrees were used for the study. Liquid was allowed to flow as a thin film over the cone surface and the flow rate was varied from 0.02 kg/s to 0.06 kg/s. The convective heat transfer coeff., h_n ranged from 135.7 to 496.7 W/m^2 C the max. for the 25 degree cone, at a flow rate of 0.06 kg/s. The overall heat transfer coeff. U_n ranged from 20.2 to 43.2 W/m^2 C. Heat utilization efficiency of the system ranged from 60.19 to 97.1%, the max. for 25 degree cone. Investigations on evaporation of water with 25 degree cone at a flow rate of 0.06 kg/s gave water evaporation rate of 6.75 kg/hr, h_b of 220.7 W/m^2 C and U_b of 63.3 W/m^2 C. A concn. of upto 17.9% total solids in milk could be achieved in 30 min when 5 kg of raw milk was used with water evaporation rate of 5.5 kg/h in milk. AS

1939

Min (DB) and Lee (S-H). **Gas chromatographic determination of carbon dioxide in non-fat dry milk during non-enzymic browning reaction.** *Journal of the Science of Food and Agriculture* 53(1): 1990; 93-99

Carbon dioxide formation in non-fat dry milk during accelerated non-enzymic browning reaction was determined by GC. Carbon dioxide content in the headspace of the sample bottle increased as the non-enzymic browning reaction increased. Non-fat dry milk containing added 0, 15 or 30 g kg^{-1} lysine in the air-tight serum bottle was stored at 55, 65 or 75 C. The coefficients of variations for reflective spectroscopic brown colour measurement and GC carbon dioxide detn. were 1.37 and 1.30% resp. The av. correlation coefficient between brown colour development and carbon dioxide formation for the 9 samples during storage was 0.96. The simple, fast and reproducible gas chromatographic carbon dioxide determination method could be used to study non-enzymic browning reactions in foods or to complement other analytical methods in measuring the non-enzymic browning reaction. AS

1940

Halim (HK) and Shoemaker (CF). **Effect of addition of α-, β-, and k-casein, and Na-caseinates on viscoelastic properties of skim milk curd.** *Journal of Texture Studies* 21(3): 1990; 323-337

Creep compliance was used to determine the effects of the addition of α-, β-, and k-casein, and Na-caseinate on the viscoelastic properties of skim milk curd. The results of all measurements can be represented by a six-element mechanical model. Addition of α-, β-casein, and Na-caseinate (1.80g/L) to raw skim milk reduced the instantaneous modulus of rigidity and final viscosity of the curd, while k-casein addition at the same level increased both viscoelastic parameters. Shielding of k-casein and depletion of serum Ca^{++} ions by α- and β-casein is thought to have caused the reduction of curd rigidity and viscosity. Subsequent experiments indicated that the addition of β-casein before and

after rennet hydrolysis produced different curd strength with the latter producing a stronger curd. AS

1941

Tamplin (TC). **Milk pasteurization.** *Journal of the Society of Dairy Technology* 43(2): 1990: 31-33

This article discusses principles of HTST pasteurization. Flow diagram of a typical pasteurizing plant is given. Cleaning in place system is also mentioned. JSS

1942

Phillips (JD) and Griffiths (MW). **Prediction of the shelf-life ofpasteurized milk using dry medium culture plates (3 M petrifilm, hygicult and millipore sampler).** *Journal of the Society of Dairy Technology* 43(2): 1990: 45-49

Petrifilm SM Plate, Hygicult and Millipore Total Count Sampler were compared with normal plate count procedures for the enumeration of bacteria after preincubation of pasteurized milk. There were good correlations between results obtained using normal plate counts and those obtained with each of the other methods. Coupling these counting methods with preincubation procedures of 21 C for 25 h in the presence of crystal violet-penicillin-nisin allowed prediction of the pass rate of the recently introduced 6 C/5 day storage test for pasteurized milk. The predictive accuracy was slightly improved by the use of preincubation conditions of 15 C for 25 h. The availability of these devices enables quality control procedures to be set up on even the smallest processing site. AS

1943

Gaze (JE) and Brown (GD). **Application of alginate particle techniques for the assessment of lethality in UHT processes.** *Journal of the Society of Dairy Technology* 43(2): 1990: 49-52

An alginate particle technique has been developed at Campden Food and Drink Research Association in order to assess the lethal effect achieved in aseptic processes. It incorporates the main food component of the product being tested with alginate and allows microorganisms to be immobilized in particles that are formed to shapes and sizes which stimulate those in the product. Any destruction of the microorganism gives a quantitative indication of the total integrated lethality achieved in each particle. This technique has been tested at temp. ranging from 60-140 C in various processing equipment, including an experimental recirculating fluid system, scraped surface heat exchangers and Ohmic heaters. The data illustrate that the technique gives a valuable assessment of lethality, which may be used as an indication or confirmation of process lethality. AS

Milk products

Butter

1944

Micich (TJ). **Behaviour of polymer-supported digitonin with cholesterol in the absence and presence of butter oil.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1839-1843

Digitonin was bound covalently to carboxypolystyrene and carboxymethylpolystyrene via an ester linkage. Polymers were prepared by reacting the polymer acid chloride in pyridine with digitonin or by coupling digitonin directly to the carboxy polymer with dicyclohexylcarbodiimide. Samples containing 0.04-0.23 mmol of digitonin/g of polymer complexed cholesterol from hexane solutions of butter oil or cholesterol. Cholesterol was completely stripped from the polymer samples by room temp. benzene extraction, yielding a reactivated polymer with essentially the same cholesterol-complexing ability as the original polymer. The cholesterol-digitonin complex is stable to isobutyl alcohol extraction. AS

Cheese

1945

Goyal (GK) and Babu (KE). **Influence of packaging systems on the microbiological quality of processed cheese during storage.** *Journal of Food Science and Technology (India)* 28(1): 1991: 39-41

Microbiological quality of processed cheese packaged in small lacquered tins (P1), polystyrene cups (P2), and low density polyethylene tubs (P3), when stored at 30 C/60% RH and 7-8 C/80% RH, resp., revealed that P1 was the best package, followed by P3 and P2 for storing processed cheese under the above two conditions, of temp. and RH. AS

1946

Davidson (BE), Tulloch (DL), Tanskanen (EI) and Hiller (AJ). **Recombinant DNA technology for improvement of cheese starter organisms.** *Food Australia* 42(10): 1990: 491-493

The molecular genetics of *Latobacillus lactis* bacteria (used in manufacture of cheese) are discussed and their potential for strain improvement. Pulsed field gel electrophoresis of restriction endonuclease digests of the chromosome of these bacteria yields

gel pattern that are strain specific. This technique of genetic finger printing will be most useful to the cheese factory microbiologist for routine maintenance of strain stock and for verifying that phage resistant derivatives generated in the factory have the same genetic properties as their parents. SRA

1947

Banks (J). **The quality of milk in relation to cheese manufacture.** *Journal of the Society of Dairy Technology* 43(2): 1990: 35-39

This paper highlights some of the effects of gross comp. and bacteriological quality of milk used in cheese manufacture on both yield and the quality of the cheese produced. The advantages of standardizing the casein to fat ratio in milk and extending the storage life of milk by thermization and deep cooling are discussed in relation to cheese manufacture. BV

1948

Dib (HA), Morris (A) and Warren (P). **Development of standard methods for the production of Lebanese whole milk and filled milk soft white cheese.** *Tropical Science* 30(2): 1990: 109-119

Following the development of a standard method for the production of whole milk soft white cheese, the effects of renneting temp. and treatment of the curd on factors such as coagulation time, curd tension, moisture content and compressibility of the cheese were examined. The product was then used as a standard with which to compare cheeses produced from filled milk. When emulsions of vegetable oil and reconstituted skim milk powder were substituted for liquid whole milk, the resultant filled cheese was of poor textural quality. The effects of adjusting the renneting temp., pH, and the addition of calcium chloride on the quality of filled cheese were studied and a method for the production of filled cheese, of comparable quality to whole milk, soft, white cheese, was formulated. AS

Cheddar cheese

1949

Dinakar (P), Mathur (MP) and Datta Roy (D). **Differences in proteolytic behaviour in Cheddar cheese prepared with calf and vegetable rennet.** *Indian Journal of Dairy Science* 42(4): 1989: 792-796

Cheddar cheese was prepared from cow or buffalo milk with either calf rennet or a soluble partially purified enzyme of *Withania coagulans*. Differences were observed in the proteolytic behaviour between the two milk clotting enzymes during cheese ripening. *W. coagulans* showed more bitter and astringent fractions on Sephadex G-25 than calf rennet. Extent of proteolysis was less in buffalo milk Cheddar cheese than cow milk. Poly acrylamide gel electrophoresis showed that β - casein is broken down extensively by *W. Coagulans*, leading to bitterness while calf rennet preferred s1 - casein. Origin and nature of low mol. wt. peptides rather than its quantity is critical to bitterness in cheese. AS

1950

Jha (YK) and Singh (S). **Effect of Modilase enzyme on characteristic flavour of buffalo Cheddar cheese without and with *L. casei* at different ripening temperatures.** *Journal of Food Science and Technology (India)* 28(1): 1991: 18-22

Buffalo milk with C/F ratio 0.70 was used to manufacture Cheddar cheese using Modilase without and with *Lactobacillus casei*. *L. casei* was added at 0.5% to buffalo milk along with starter culture. The Cheddar cheese ripened at 8 plus or minus 1 C, 15 C for 3 wks, 15 C for 6 wks, 20 C for 3 wks, and 20 C for 6 wks then transferred to 8 plus or minus 1 C for further ripening were analysed for its sensory characteristic and biochemical changes. *L. casei* treated cheese samples ripened at 15 C for 6 wks and 20 C for 6 wks then transferred to 8 C showed characteristic cheesy flavour after 4 months of ripening in comparison to cheese samples made without *L. casei* produced cheesy flavour after 6 months of ripening at 8 C. Characteristic cheesy flavour was found to be related to glycolysis, proteolysis and lipolysis during ripening. AS

Turkish cheese

1951

Kivanc (M). **mold growth and presence of aflatoxin in some Turkish cheeses.** *Journal of Food Safety* 10(4): 1990: 287-294

Twenty five fresh market samples of Van Herby cheese and pickled white cheese were examined for molds and aflatoxins. The mean total mold content in Van Herby cheese was 2.5×10^{5}/g; in pickled white cheese it was 4.95×10^{4}/g. Over 65% of the molds *Penicillium* species, *Aspergillus* made upto 1.6% and 2.6 to 4.0% of the mold on pickled white cheese and Van Herby cheese, resp. None of the samples contained aflatoxins. KMA

Chhana

1952

Goyal (GK) and Srinivasan (MR). **The effects of packaging systems on the chemical quality of chhana during storage.** *Indian Journal of Dairy Science* 42(4): 1989: 775-782

The effect of 3 different flexible packaging materials and tin cans on the chem. quality of 3 types of chhana samples stored at 37.0 plus or minus 0.5 C and 60% RH for various time intervals were studied. No significant chem. changes in chhana samples stored in tin cans for periods upto 3 days was noticed. The flexible packaging materials are less effective in preventing chem. changes to the samples during storage. BV

1953

Suguna Rao (M), Rama Rao (M), Ranganadham (M) and Rao (BVR). **Studies on preparation of chhana from buffalo milk and its suitability for *Rasogolla* manufacture.** *Indian Journal of Dairy Science* 42(4): 1989: 810-816

Khoa

1954

Garg (FC), Patel (AA), Patil (GR), Rajorhia (GS) and Gupta (SK). **Textural changes in khoa during holding.** *Indian Journal of Dairy Science* 42(4): 1989: 804-809

Post-manufacture holding of khoa was investigated with respect to the textural changes in the product. Instron hardness, guminess, chewiness and adhesiveness of khoa, particularly of low-moisture type, registered a definite rise during holding at 30 C for 72 h. Cohesiveness and springiness, however, remained largely unaffected. Dynamic viscosity of the product followed a similar trend as hardness. The moisture content remaining unaltered during holding, the observed changes in texture of khoa were considered attributable to probable changes in the physical status of the product constituents. AS

1955

Boghra (VR) and Mathur (ON). **Chemical quality of some marketed indigenous milk products. II. Mineral composition of khoa.** *Journal of Food Science and Technology (India)* 28(1): 1991: 59-60

Forty samples of khoa from 5 different shops of Karnal city were analysed for minerals. A noticeable difference for Mg, P and Zn between samples and a significant variation for Ca among shops were observed. The market samples of khoa contained (mg/100g) Ca 654.00, Mg 66.67, P 376.55, citrate 517.36, Na 182.88, K 368.00, Chloride 331.65, Cu 0.16, Fe 2.43 and Zn 2.43. AS

Kulfi

1956

Rajor (RB) and Vani (B). **A new approach for the manufacture of kulfi.** *Indian Dairyman* 43(6): 1991: 256-259

The study was undertaken to explore the possibility of utilization of low-cost, quality protein and fat 'soy solids' in combination with skim-milk solids for manufacture of kulfi (frozen milk based dessert) like product which otherwise is manufactured from whole milk. Whole soybean was soaked, blanched, disintegrated, added with equal quantity of skim milk solids to have 30% solids at the end. Sugar and alginate were added and pasteurized. They were filled in kulfi cones and frozen, cardamom and nuts were added. The product had good consumer acceptance. Freezing with ice and salt had better sensory and physical properties which could be adopted when manufacturing on large scale. It was observed that the former had better sensory and physical properties as compared to the latter. SRA

Milk powder

1957

Zbikowski (Z), Zbikowska (A) and Ziajka (S). **Studies on reconstitution of milk from milk powder depending on water temperature.** *Acta Alimentaria Polonica* 15(3): 1989: 243-251

Studies were carried out on the reconstitution of milk from milk powder depending on the temp. of water used (10-90 C, 10 C intervals). The temp. of water affected the reconstitution process as well as the final appearance of the milk. It was also found that wettability and dispersibility of the milk powders depended on the technical parameters of the powder production process. AS

Paneer

1958

Boghra (VR) and Mathur (ON). **Chemical quality of some marketed indigenous milk products. I. Major constituents and mineral composition of paneer.** *Journal of Food Science and Technology (India)* 28(1): 1991: 57-58

Analysis of samples of paneer collected from shops in Karnal city market showed wide variations in moisture and fat. The ash content also varied. The av. moisture content ranged between 56.2 and

61.4%. The fat content ranged from 18.30 to 22.7%. Overall value of 21.4% fat in samples on dry basis was just above Prevention of Food Adulteration Act's limit of 50% on dry matter basis, while samples from some shops did not correspond to the legal min. limit. Shop to shop variation for pH values was also observed. AS

Wheys

1959

Gandhi (DN) and Rajeev Prasher. **Use of whey based formulation in controlling gastro-intestinal disorders.** *Indian Dairyman* 43(6): 1991: 266-269

Gastro-intestinal (GI) disorders and their causative agents, source of electrolytes to control GI disorders, comparison between standard oral rehydrating solution and whey based formulation in controlling GI disorders and the experience with the application of whey based formulations in controlling GI disorders are the aspects covered. SRA

Yakhni

1960

Samoon (AH) and Sharma (N). **Processing and preservation of yakhni - a popular milk and meat-based beverage of Kashmir.** *Indian Dairyman* 43(7): 1991: 318-323

The salient findings on the origin, current status and consumer acceptability of Yakhni, a milk and meat based product is featured. Fresh cow milk was heated to boiling and cooled to 30-35 C. Starter culture at 1% level was added and kept at 30 C in an incubator for 8-10 h. Curds obtained with a pH of 3.7-4.0 and acidity 0.75-0.85% was refrigerated at 4 plus or minus 1 C. Spices like cardamom, cloves, aniseed and ginger were cleaned, powdered and sieved through muslin cloth. Onion and garlic were peeled and fried in oil and ground to form a paste. A known quantity (2 kg) of curd was heated, stirred to form a homogenous fluid consistency, equal quantity of (2 kg) water was added, with slow heat the gravy was added with condiments. 2 kg of mutton emulsion was moulded into meat balls and transferred to gravy and cooked for 30 min. Cooked gravy thus obtained was designated as 'Yakhni'. This was sprinkled with little dried mint powder and served for sensory evaluation. Processing schedule and recipe of manufacture were standardised through several trials. Yakhni is rich in nutritive value and possesses high appealing flavour and other palatability characteristics. This can be refrigerated at 4 plus or minus 1 C in LDPE bags for at least one wk, without much change in its sensory quality. SRA

Yoghurts

1961

Maciejska (A) and Czarnocka-Roczniakowa (B). **Possibilities of utilization of penicillinase-positive strains of *Micrococcus* sp. in the technology of fermented milk products. III. Attempts to utilize penicillinase -positive strains of *Micrococcus* sp. for the manufacture of yoghurt.** *Acta Alimentaria Polonica* 15(3): 1989: 261-266

Milk proteins

1962

Ghosh (J), Malhotra (GS) and Mathur (BN). **Hypersensitivity of human subjects to bovine milk proteins: A review.** *Indian Journal of Dairy Science* 42(4): 1989: 744-749

Allergy to bovine milk protein is known to occur mainly during infancy, but rarely continues beyond the second yr of life span. Various forms of milk allergy syndrome have been well documented, but present difficulties in the clinical diagnosis. Tests based upon IgE mediated reactions have been favoured in recent yr for the clinical diagonsis. Development of hypersensitivity to bovine milk proteins among human subjects has been attributed to various factors such as heredity, intestinal permeability, immune responsiveness and exposure to food. The mechanism of milk allergy has been the subject of several recent investigations. Among bovine milk proteins, β-LG is regarded as the most allergen of all milk proteins, whose hydrolytic products also tend to induce allergy syndrome. Feeding of bovine milk as breast milk substitutes to hypersensitive infant subjects calls for special technological approaches for producing safer formulae. AS

1963

Murphy (JM) and Fox (PF). **Fractionation of sodium caseinate by ultrafiltration.** *Food Chemistry* 39(1): 1991: 27-38

A method for the fractionation of sodium caseinate into a β-casein-rich permeate and an α_s/K-casein-rich retenate has been developed using ultrafiltration through 300 000 dalton cut-off membranes at 4 C. The β-casein fraction was 80% homogeneous, γ-caseins being the principal contaminants; most of the β-casein could be recovered in the permeate by diafiltration or repeated ultrafiltration. For the successful recovery of β-casein, it was essential to dissolve the sodium caseinate in deionized or distilled water but pH in

the range 7-9 was not significant. A caseinate concn. of 1% was optimal in terms of yield and ease of operation. AS

Caseins

1964

Gupta (VK), Mulay (CA) and Mathur (BN). **Colour characterization employing reflectance spectroscopy of edible casein and caseinates prepared from fresh and sour buffalo milks.** *Indian Journal of Dairy Science* 42(4): 1989: 783-786

Colour characteristics of edible casein and Na and Ca caseinates prepared from fresh, 0.2, 0.3 and 0.4% TA buffalo milks were characterized employing reflectance spectroscopy over the entire visible range of wavelength (400-700 nm). A sharp reflectance minima at 560 nm and small inflections at about 553, 592 and 693 nm were observed in all edible casein and caseinates samples, irrespective of the acidity of buffalo milk from which they were prepared. Higher reflectance spectra was observed in case of fresh milk edible casein in the range of 400-550 and 570-580 nm (representing violet, blue, green and yellow hues) over the range of 580-700 nm (representing red hue), but lower values were observed with edible casein samples in the same range of wavelengths. Caseinates displayed somewhat lower reflectance values in the range of 400-550 nm and higher reflectance values in the region of 580-700 nm compared to corresponding edible caseins, as also seen in a whiter appearance in the former. Ca caseinates displayed a steadier trend of reflectance values than Na caseinates, as visually observed in a denser whiteness than in the latter. AS

MEAT AND POULTRY

Meat

1965

Daudin (JD) and Swain (MVL). **Heat and mass transfer in chilling and storage of meat.** *Journal of Food Engineering* 12(2): 1990: 95-115

The kinetics of temp. and wt. loss for meat or phenolic foam 'model' samples were measured during chilled storage. The results were analysed by considering the basic equations which describe the simultaneous heat and mass transfer through the boundary layer and used to evaluate the av. heat and mass transfer coeff. and the water activity of the meat surface. The mass transfer coeff. was found to be independent of the temp. (2 to 5 C) and the relative humidity (52 to 87%) of the air in chilled storage conditions and proportional to the square root of the air velocity in the range of 0.25 to 1.5 m/s. A relationship which takes into account radiative heat transfer is given to enable the heat transfer coeff. to be predicted from the mass transfer coeff. The water activity of the meat surface was observed to fall slowly when the initial drying rate was greater than 15×10^{-6} kg/s m^2. AS

Beef

1966

Seideman (SC), Crouse (JD) and Cross (HR). **High-temperature conditioning of hot-boned beef subprimals.** *Journal of Food Quality* 12(2): 1989: 145-153

Mutton

1967

Vasundhara (TS), Kumudavally (KV) and Bhagirathy (B). **Free fatty acid contents and off-flavour in commercial canned mutton curry.** *Journal of Food Science and Technology (India)* 28(1): 1991: 61-63

Nine commercial samples of canned mutton curry exhibiting commercial sterility but possessing putrid smell showed very high levels of total free fatty acids (FFA) comprising mainly of palmitic, stearic and oleic acids. Lab. studies have established that levels more than 2000 mg/100 g lipid are generally seen when substandard meats are used for processing. Analysis of the above samples showed a high degree of correlation between the FFA content and off-flavour. AS

Pork

1968

Prusa (KJ), Love (JA) and Christian (LL). **Fat content and sensory analysis of selected pork muscles taken from carcasses with various backfat levels.** *Journal of Food Quality* 12(2): 1989: 135-143

Products

1969

Beilken (SL), Eadie (LM), Jones (PN) and Harris (PV). **Quality assessment of manufactured meat products.** *Food Australia* 42(11): 1990: 532-536

Bacon

1970

Thayer (DW), Shieh (JJ), Jenkins (RK), Phillips (JG), Wierbicki (E), Ackerman (SA). **Effect of gamma**

ray-irradiation and frying on the thiamine content of bacon. *Journal of Food Quality* 12(2): 1989: 115-134

The effects of ionizing irradiation and frying on the thiamine and riboflavin content of bacon were determined. Significant destruction of thiamine but not riboflavin occurred during both the irradiation and frying. The destruction of thiamine was found to be directly related to the dose of ionizing radiation or the degree of cooking. Frying before irradiation, reduction of water content by lyophilization, and irradiation at -40 C rather than 2 C produced significantly greater retention of thiamine. Frying the bacon following irradiation produced radiation dose-related, nonadditive, increased destruction of thiamine. The protective effect of frying before irradiation was not directly linked with the reduction of moisture by frying. AS

Sausages

1971

Astiasaran (I), Santamaria (I), Villanueva (R) and Bello (J). **Modifications of nitrogen fraction during the curing process of "chorizo" as a function of the applied technology.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 211-218 (Es)

Modifications of some parameters in N fraction were studied during the curing of two types of "chorizo" (a Spanish dry sausage) prepared with different technology: minced meat using a machine of 16 mm plate (type A) and 3 mm plate (type B). Proteolysis phenomenon appears much smaller in type A than in type B. Protein denaturation results of similar extent in both, type A and type B. This denaturation occurs fundamentally in the fermentation phase in "chorizo" type A and more slowly during the whole process in "chorizo" type B. Protein solubility loss is different in extent (sarcoplasmic) and in the phase in which takes place (myofibrillar) between both types of "chorizo". AS

Poultry

1972

Butala (VG) and Rajagopal (S). **Effect of dietary tallow on carcass fat and serum cholesterol profile in white leghorn cockrels.** *Journal of Food Science and Technology (India)* 28(1): 1991: 66-67

Studies carried out to assess the effect of cockrel growth rations based on deoiled rice bran (DRB) and its enrichment with graded levels of tallow (2, 4 and 6%) revealed significant elevations of serum cholesterol and carcass (body) fat content at 6% level compared to other groups. AS

Chickens

1973

Mir Salahuddin, Kondaiah (N), Anjaneyulu (ASR), Panda (B) and Bisht (GS). **Effect of phosphate on the quality of chicken kababs.** *Indian Journal of Poultry Science* 26(1): 1991: 39-43

The effect of tetrasodium pyrophosphate (TSPP) on the quality and acceptability of kababs from spent hen meat under hot, chilled and frozen conditions of handling has been studied. Meat from spent hens got by hand deboning, was divided into 3 portions; one portion was used as hot meat and processed within 3.5 h postmortem, the second part was chilled and stored at 5 C for 24 h and used as chilled meat, and the third one was frozen and stored at -10 C for 7 days and partially thawed at 5 C for 15 h before use. Minced meat was mixed with condiments, salt, spices and TSPP (0.5%). Kababs after cooking at 230 plus or minus 2 C for 3 min. were evaluated for appearance, flavour, juiciness, texture, mouthcoating and overall palatability. Computer analysis of data from 3 trails indicated that addition of TSPP increased the pH to 0.34 unit, improved the emulsion stability (7.48%) of the mix, and cooking yield (6.02%) and showed higher moisture retention resulting in a juicy product. Phosphate treated kababs were rated better by sensory evaluation and consumer acceptability. SRA

1974

Phetteplace (HW) and Watkins (BA). **Lipid measurements in chickens fed different combinations of chicken fat and menhaden oil.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1848-1853

Presently, the specific level of dietary fish oil necessary to decrease plasma triacylglycerols in humans or poultry is not known. The experiment described herein was conducted to evaluate the effects of varying levels of menhaden oil on plasma triacylglycerols in broiler chickens. Six lipid treatments consisting of chicken fat/menhaden oil combinations were fed at 50 g/kg of diet. There were no significant differences in body, liver, heart, and abdominal fat pad wt. or in total liver lipids and liver triacylglycerols due to the dietary treatments. As the levels of dietary *n*-3 fatty acids and the polyunsaturate:saturate ratios increased, the amounts of triacylglycerols decreased in the plasma and in the very low density plus low density lipoprotein (VLDL + LDL) fractions. On the other hand, plasma triacylglycerol levels increased as the dietary *n*-6 fatty acids increased. The dietary intake

of 8n$-3 polyunsaturates in menhaden oil led to elevated levels of these fatty acids in the chicken tissues evaluated. AS

Products

Eggs

Egg whites

1975

Kato (A), Ibrahim (HR), Takagi (T) and Kobayashi (K). **Excellent gelation of egg white preheated in the dry state is due to the decreasing degree of aggregation.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1868-1872

Mol. wt. of heat-induced soluble aggregates of a diluted solution of dry heated egg white proteins (DEW) were determined by HPLC using a TSK gel G3000SW column. Elution was monitored by a low-angle laser light scattering photometer and a differential refractometer. The av. mol. wt. of DEW aggregate decreased greatly with increases of preheating time in the dry state and the gel strength greatly increased. The mol. wt. distribution curve shifted toward lower mol. wt. and became sharper with increases in preheating time in the dry state. In addition, the expanded structure of polymer formed from preheated DEW was predicted from the plots of mol. wt. vs retention time of heat-induced DEW aggregates. Good correlation was observed between decreases in mol. wt. and increases in gel strength of dry-heated DEW in various gelation temp. AS

SEAFOODS

1976

Knorr (D). **Recovery and utilization of chitin and chitosan in food processing waste management.** *Food Technology* 45(1): 1991: 114-122

This paper briefly reviews recovery and utilization of chitin and chitosan. Aspects covered include: recovery of chitin and chitosan, conversion and uses as a diet supplement: biosorption of heavy metals, dyes and pesticides: protein recovery: affinity purification: clarification of beverages: production of biodegradable packaging films and wildlife protection. 60 references. BV

Oysters

1977

John Chellappan (N). **Processing of oyster meat for freezing.** *Fishery Technology* 28(2): 1991: 122-124

The effect of depuration and processing methods on the yield and chem. comp. of meat was studied. Live oysters were washed and kept in filtered running sea water in a depuration tank; half of the oysters were collected after 12 h and the remaining after 24 h depuration. After chlorination one part was dipped in boiling water for 3-5 min in gunny bags and the other part was steamed till it opened the shell. The meat was hand shucked and washed in chilled water and drained, then dipped in 2% brine solution containing 0.2% citric acid for 10 min, drained, packed in polythene bag, frozen at -40 C and stored at -20 C. Moisture, total protein, lipid, ash and insoluble ash, Na, K and Ca, α-amino N, glycogen and inorganic P were determined. The % yield of meat was 5.41 and 5.00 for 12 and 24 h depurated oysters resp. shucked after dipping in hot water. The yield of meat from steamed oyster was 4.5%. The depuration time of 24 h reduced substantially the sand content. The acid insoluble ash content was reduced and α-amino N content increased by depuration. No mortality was found after 24 h depuration. The gut of the oysters after 12 h depuration was greenish but after 24 h changed to white. The oyster meat recovered after steaming had good shape and appearance, firm and tender compared to meat recovered after dipping in boiling water. The meat of steamed oyster had high ash content and less moisture loss. A depuration period of 24 h and steaming for opening the shell for shuckling yielded good quality meat. SRA

Prawns

1978

Chandrasekharan (M), Lakshmanaperumalsamy (P) and Chandramohan (D). **Combined effect of environmental factors on spoilage bacteria.** *Fishery Technology* 28(2): 1991: 146-153

Effect of temp., pH and sodium chloride concn., individually and at various combinations, on the growth and survival of spoilage bacteria was studied in flesh broth and Zobells broth. 8 isolates, belonging to 3 different genera viz., *Pseudomonas*, *Vibrio* and *Acinetobacter*, harvested from spoiled *Penaeus indicus* were stored at 5, 15, 30, 35 and 50 C temp., 2, 4, 6, 8, 10 and 12 pH and 0, 1, 3, 6, 10 and 15% sodium chloride concn. Optimum growth condition was 15 to 45 C and pH of 5-10. The growth pattern of all the isolates, in response to various sodium chloride concn. was not similar in flesh broth and Zobells broth. Optimum sodium chloride concn. was found to vary from 1-6%. Influence of more than one environmental factor on the growth of spoilage bacteria was tested at various levels in flesh media by maintaining one of the factors

constant and altering the other two. Results suggested that at extreme conditions each individual factor had an independent influence on the growth of bacteria. SRA

Shrimps

1979

Abraham Tharakan. **Shrimp production in India - a review.** *Seafood Export Journal* 23(4): 1991: 5-14

Covers briefly the shrimp export over the years, catch pattern and extent of exploitation, Indian position in world production, species comp., supply prospects (inshore capture, deep sea fishing, aquaculture), domestic consumption, contribution and role of processing factories (capacity, methods) quality control, marine products export development authority. SRA

Squids

1980

Selvaraj (P), Indira Jasmine (G) and Jeyachandran (P). **Effect of ascorbic acid dip treatment on frozen storage of squid (*Loligo duvaucelii*, Orbigny).** *Fishery Technology* 28(2): 1991: 117-121

Fresh squid *Loligo duvaucelii* procured from Tuticorin fishing harbour was dip treated for 10 min with 0.5% (w/v) ascorbic acid and the untreated was kept as control. The mantles were packed in 150 guage polyethylene pouches and quick frozen at -40 C in contact plate freezer and stored at -20 C for 9 months. Samples were analysed for physical, biochemical, microbiological and sensory characteristics at monthly intervals. Thaw drip wt. loss on thawing and on cooking increased gradually during the storage period both in control and treated squid. Ascorbic acid treatment did not show significant effect on wt. loss on thawing and cooking. Moisture content of the squid decreased gradually during frozen storage: moisture loss was less in ascorbic treated samples. Trimethylamine increased gradually in both samples during frozen storage. Total volatile N (TVN) also increased gradually during frozen storage and the control showed a higher value of 29.6 mg % as compared to 21.3 mg % for treated squid at the end of 9 months storage. α-amino N, salt soluble N, non-protein N decreased on frozen storage but was less in ascorbic acid treated samples. The increase in thiobarbituric acid values was less in treated samples. The sensory score decreased during frozen storage in all samples. The treated samples were acceptable after 9 months storage while the control was acceptable upto 6 months. Hence the ascorbic acid treatment improved the overall acceptance and shelf-life of squid compared to control during frozen storage. SRA

1981

Rahman (MS) and Potluri (PL). **Shrinkage and density of squid flesh during air drying.** *Journal of Food Engineering* 12(2): 1990: 133-143

Shrinkage of rectangular slabs of squid flesh during air drying at 70 C and 15% relative humidity was determined. A material balance equation considering dry fibre, water and air phases can predict the bulk shrinkage and apparent density of squid flesh. AS

Squilla

1982

Lekshmy Nair (A), Madhavan (P) and Prabhu (PV). **Nutritional studies on the evaluation of the safety of squilla protein.** *Fishery Technology* 28(2): 1991: 142-145

Squilla was cleaned, washed and passed through a meat bone separator and aqueous extrudate was collected, chitinous matter was removed. The extract was warmed to 60-70 C, blended well and filtered. Filtrate was spray dried. The powder was used for the preparation of the experimental diets. Casein (SRL) was used as the reference protein. Albino rats were given 10 and 20% protein for 24 wk and the growth and reproductive performance were compared with those on casein fed at 10% protein level. The fertility index for the control group was higher than the group fed on experimental diets. Gestation index was similar for all groups. Lactation index was also similar except that mortality was observed in two cases for the group fed on squilla protein at 10% level. Av. number of pups born alive was also lower for the 10% squilla protein fed group than the other two groups. The av. wt. of pups at birth and on 21st day for control and 20% squilla protein group were similar, while it was lower for the 10% squilla protein group. No adverse effect on appearance, behaviour and survival of the rats on experimental diets were observed. SRA

Fish

1983

Hennigar (CJ), Buck E. M., Hultin (HO), Peleg (M) and Vareltzis (K). **Mechanical properties of fish and beef gels prepared with and without washing and sodium chloride.** *Journal of Food Quality* 12(2): 1989: 155-166

Excellent gels, as measured by fold test, were prepared from 3 species of fish without first washing the minced tissue. Dependent on species (red hake, cod, or winter flounder), excellent to adequate gels, as determined by the fold test, could be prepared from fish muscle without NaCl provided that the minced tissue was washed prior to gel formation. Postrigor beef formed inadequate gels while excellent to good gels could be produced from prerigor beef although salt was a requirement. The concn. of contractile proteins in fish gels was estimated and they did not appear to be a major factor determining gel quality. Soluble muscle protein did not appear to interfere with gel formation either. Percent expressible moisture, percent recovery, and modulus of deformability did not relate well to fold test scores. AS

Anchovies

1984

Punna Reddy (K), Sudhakara (NS), Rudra Setty (TM) and Surya Prakash Rao (V). **Drying of anchovies (*Stolephorus indicus*) in a solar polythene tent.** *Fishery Technology* 28(2): 1991: 132-133

The quality of anchovies dried in solar tent dryer and under sun has been compared. Fresh anchovy (*Stolephorus indicus*) of the purse seine catch were collected and one portion was wet salted in saturated brine in the ratio 1:1 for 4 to 4 1/2 days. Wet salted and unsalted anchovies were dried in sun and in solar tent dryer. The water activity of fish and solution were noted. Drying was carried out for 8 h each day. The products were dried till they attained constant wt. Though the temp. inside the tent was 14-15 C higher than the ambient temp. during early afternoon in sunny days the drying rate did not show any significant difference between the two methods. Hence, solar tent dryer offered little merit but for the protection given by the tent against dust, insects, birds or sudden shower. SRA

1985

Prabhu (PV) and Kandoran (MK). **Sun-drying of anchoviella on racks.** *Fishery Technology* 28(2): 1991: 134-136

Anchovila (*Stolephorus* spp.) were washed and spread uniformly on plastic wire mesh tray with wooden frame. These trays were kept on each deck of a 4 deck drying system. Anchovies spread on trays were also kept on cement floor and on black surface. The initial wt. and the loss of wt. at intervals on each surface were noted. After proper drying the samples were packed in polythene bags and kept at ambient temp. of 28 plus or minus 2 C for storage studies. Samples were analysed for chem. and sensory characteristics. Though the initial drying was higher on the top deck of the rack, all the samples attained almost uniform moisture by 9 h drying. By 7 h drying the samples on the black surface and top deck showed 71-72% wt. loss while in others it was 63-65%. Drying was complete in all samples by 9 h and wt. loss was 72.5 - 75.0%. The dried fish had good colour and appearance. During storage, the white colour faded to yellow and turned to brown. All samples became slightly rancid by 22 wk and highly rancid by 44 wk. SRA

Hakes

1986

Montero (P) and Borderias (AJ). **Characteristics of hake (*Merluccius merluccius* L.) collagen in different capture seasons.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 266-271 (Es)

The present study deals with variation in muscle connective tissue of hake (*Merluccius merluccius* L.) during the yr, due to the biological, quantitative analyses of connective tissue, solubility of collagen and variation in the proportion of α-, β- and γ-components. The results indicated that there are not quantitative variation in the connective tissue, and there are not high differences in the aggregation of the collagen, as measured by solubility and analyses of α-, β- and γ-components, between different seasons of capture along the yr. AS

Mullets

1987

Gupta (SS), Subrata Basu, Panduranga Rao (CC) and Chakraborti (R). **Preservation of mullets in CO_2 enriched gas-mixture at 6-7 C.** *Fishery Technology* 28(2): 1991: 125-127

Fresh mullet, *Mugil keelarti* collected from the local landing centre was washed and (i) packed in 200 guage HDPE bags in normal atm.; (ii) packed in 200 guage HDPE bags in CO_2 air mixture of 3:2 and 4:1. The air tight sealed bags were stored at 6-7 C. Analysis were done for total volatile basic N (TVBN), total bacterial count and sensory characteristics. Raw and cooked fish were evaluated for appearance, texture, odour and flavour. It was found that fish stored in 3:2 gas mixture was acceptable upto 9 days, whereas those stored in 4:1 mixture were acceptable upto 10 days and control were acceptable upto 7 days. SRA

Psenes indicus

1988

Chakraborti (R), Gupta (SS) and Panduranga Rao (CC). **Preparation of salted-pressed *Psenes indicus* and its storage characteristics.** *Fishery Technology* 28(2): 1991: 137-141

P. indicus kept in ice for 4 to 6 h were gutted, beheaded, washed and dressed. They were immersed in saturated brine alone and saturated brine with 0.1% (v/v) propionic acid for 7 days and pressed at 0.048 - 0.08 kg/cm ^{2} pressure. Water activity of the salted fish was determined at 24 h interval over a curing period of 7 days. Fish of both samples were packed in 200 gauge polythene bag without vacuum and 70 μ nylon/surlyn bag under vacuum. Fish packets were stored in card board boxes at ambient temp. (36 plus or minus 9 C) and RH 67 plus or minus 33%. They were analysed fortnightly for total N, fat, moisture, sodium chloride, total volatile base N and peroxide value. The salted and pressed fish was washed in potable water and boiled in 10 times water by wt. for 10 min. for sensory evaluation. The salted and pressed fish packed in 70 μ nylon/surlyn bag under vacuum was acceptable upto 120-135 days, while those packed in 200 gauge polythene bag without vacuum was acceptable for 45-60 days at ambient temp. Fish treated with 0.1% propionic acid had 15 days longer storage life than the untreated fish. SRA

Rainbow trout

1989

Suparno, Rosenthal (AJ) and Hanson (SW). **Kinetics of the thermal destruction of thiamine in the white flesh of rainbow trout (*Salmo gairdneri*).** *Journal of the Science of Food and Agriculture* 53(1): 1990: 101-106

Thin slices of white flesh from rainbow trout (*Salmo gairdneri* Richardson) were given different time-temp. treatments and the D and z values for total thiamine were determined. The z values (26 C) was in good agreement with previously reported data but the D values were considerably lower than published results. Thiamine appears to be less thermally stable in the fish muscle than was previously thought. This has serious repercussions when optimising thermal processing with respect to nutrient retention. AS

Sardines

1990

Jeyasekaran (G) and Saralaya (KV). **Process development for canning of white sardine (*Kowala coval*).** *Fishery Technology* 28(2): 1991: 128-131

Fresh white sardine (*Kowala coval*) was obtained from commercial catches of Mangalore coast. Total length, standard length and total wt. of the fish were measured and dressed manually, canned yields were found out. The fish muscle was analysed for moisture, crude protein, total ash, salt and lipid contents. The fish was cut into 54 mm length and dipped in saturated brine solution at room temp. (28 C) for 4, 6, 8 and 10 min. Sanitary cans with SR lacquer coating were used. The cans were pre-cooked in steam at 100 C for 15, 30, 45 and 60 min, then drained and filled with hot oil or hot 2% brine and seamed in a vacuum double seamer. Thermal processes were standardised for three different packs of white sardine in natural pack (WSN), brine pack (WSL) and oil pack (WS3). Blanching the product in saturated brine at room temp. for 6 min, precooking the product for 45 min in steam at 100 C and sterilisation at 115.6 C for 75 min yielded a canned product with good organoleptic quality. High temp. and prolonged cooking resulted in a product with broken meat. Oil packed fish was organoleptically better than natural or brine packed products. SRA

1991

Jeyasekaran (G) and Saralaya (KV). **Effect of chilled seawater storage of white sardine (*Kowala coval*) on its canned product quality.** *Journal of Food Science and Technology (India)* 28(1): 1991: 23-26

The keeping quality of canned white sardine (*Kowala coval*) can be improved by preserving the fish immediately after catch in chilled seawater before canning. Delayed icing caused considerable deterioration in quality and reduced the storage life of canned product. It was found that fish subjected to delayed icing became unacceptable after 6 days and those treated with immediate icing and chilled seawater were acceptable upto 9 and 11 days resp, for canning. AS

1992

Fujii (T), Hirayama (M), Okuzumi (M), Yasuda (M), Nishino (H), Yokoyama (M). **The effect of storage in carbon dioxide-nitrogen gas mixture on the microbial flora of sardine.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(5): 1990: 837

Seerfish

1993

Venugopal. **Processing and packing of seerfish for export.** *Seafood Export Journal* 23(4): 1991: 22-25

Statistical data on export of fresh/frozen fish from India, market share (%) of fish exports in 1988, seerfish landing pattern in India, and chem. comp. of seerfish (moisture 71.90%, protein 17.86%, fat 8.0%, ash 1.26%, Ca 345 mg/100 g, P 17.3 mg/100 g and Fe 4.0 mg/100 g). The processing aspect of seerfish described includes dressing, freezing, grading, packing and yield. SRA

PROTEIN FOODS

Infant foods

1994

Singh (MN) and Mathur (BN). **Mineral modification of buffalo milk for infant formula manufacture employing electrodialysis. Part I. Optimization of processing variables for demineralisation.** *Indian Journal of Dairy Science* 42(4): 1989: 765-770

A study was carried out for the optimization of operating parameters for electrodialysis (ED) process for demineralization of buffalo skim milk, whey and mixture of skim milk: whey (15:85) with the objective of their utilization in the manufacture of infant feed having comparable ash content as human milk. At the two concn. of brine in the depleting stream, 0.6% brine permitted higher rate of demineralization than 1.4%. Concn. of all three feeds to higher total solids (35%) permitted greater demineralization efficiency, but problems of deposit formation were encountered with skim milk and skim milk/whey mixtures. Thus 28% TS was considered to be the upper limit under practical conditions, from view point of capacity utilization of ED stack and efficiency of demineralization. Feed rate of 90 l/h and electrical potential of 3V/cell gave optimal performance for 50% demineralization of buffalo skim milk (28% TS) rennet whey (35% TS) and 15:85 mixture of buffalo skim milk rennet whey (35% TS). AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

Breweries

1995

Daoud (IS) and Searle (BA). **On-line monitoring of brewery fermentation by measurement of CO_2 evolution rate.** *Journal of the Institute of Brewing* 96(5): 1990: 297-302

To take full advantage of computer monitoring and control systems already in existence in many breweries, there is a need for reliable and inexpensive on-line sensors. Prior to the development of any system for production scale conditions, the underlying principles of the method of measurement adopted have to be investigated. Work at the lab. (1.5 l and 11 l), pilot (30 l) and experimental brewery (100 hl) scales of fermentation has demonstrated that a good correlation exists between evolved CO_2 and changes in sp. gr. During the period from the onset of CO_2 evolution to the end of a fermentation, it was found that evolved CO_2 yield was ca. 1.0g CO_2/l/degree gravity drop. Metering systems based on evolved CO_2 detn. are nonintrusive, simple to install and cost effective. AS

1996

Peddie (HAB). **Ester formation in brewery fermentations.** *Journal of the Institute of Brewing* 96(5): 1990: 327-331

Esters are secondary products produced by brewing yeasts during the anaerobic metabolism of sugars and constitute one of the largest and most important groups of compounds affecting beer flavour. Many esters can be formed, the most important being ethyl acetate, isoamyl acetate, isobutyl acetate, 2-phenylethyl acetate and ethyl hexanoate. The odour threshold levels for ester detection are very low. Esters are especially important in high gravity brewing, where over production occurs causing unwanted solvent-like flavours. They are also important in low alcohol beer production due to the low levels produced, which can result in beers with little flavour. The factors influencing ester production are reviewed, together with the ways in which they can be used to control ester synthesis. It is beleived that acetate esters are synthesized by an enzyme called alcohol acetyl transferase (AAT) which uses as substrates an alcohol and acetyl co-enzyme A; the latter plays a central role in many intracellular reactions. However, esters can also be synthesized by esterase enzymes working in reverse. Several attempts have been made to locate the AAT enzyme and recent work suggests that it is located in either the yeast cell plasma membrane or in intracellular organelles called "vacuomes". AS

Fruit juices

1997

Joshi (VK), Chauhan (SK) and Lal (BB). **Extraction of juices from peaches, plums and apricots by pectinolytic treatment.** *Journal of Food Science and Technology (India)* 28(1): 1991: 64-65

Addition of pectinolytic enzyme (pectinol) to the pulps of plum (*Prunus salicidna*), peach (*Prunus persica*) and apricot (*Prunus armeniaca*) increased the juice yield, causing a slight change of total soluble solids, pH and acidity, and a drastic decrease in the apparent viscosity. However, it improved the colour and clarity without affecting the flavour. Optimum enzyme concn. for addition was found to be 0.5%. AS

1998

Greenway (GM) and Ongomo (P). **Determination of L-ascorbic acid in fruit and vegetable juices by flow injection with immobilised ascorbate oxidase.** *Analyst (London)* 115(10): 1990: 1297-1299

Ascorbate oxidase was immobilised on cyanogen bromide activated-Sepharose 4B and incorporated in a flow-injection system with amperometric detection at a glassy carbon electrode at +0.6 V. On passage through the immobilised ascorbate oxidase a fraction of the L-ascorbic acid was converted into dehydroascorbic acid and the decrease in signal was measured. This could be directly related to the amount of L-ascorbic acid present. The calibration graph was linear over the range 0-400 ng ml $^{-1}$ with a correlation coeff. of 0.9994. The detection limit (2) in phosphate buffer (0.08 M, pH 5.5) was 4.0 ng ml $^{-1}$. The relative standard deviation for a 200 ng ml $^{-1}$ standard was 1.0% (n = 10) and the sampling throughout was 30 samples h $^{-1}$. The method was used for the simple and rapid detn. of L-ascorbic acid in fruit and vegetable juice. AS

1999

Chandler (BV). **Fruit juice review - 5.** *Food Australia* 42(10): 1990: 486, 488-489, 506

This review covers the raw materials, juice processing (general), juice processing (citrus juices and other fruits), packaging and storage, chem. analysis and components, adulteration control, and industrial aspects. SRA

Mango juices

2000

Ragab (M) and El-Nemr (SE). **Chemical composition and volatile constituents of canned mango juice.** *Die Nahrung* 34(7): 1990: 591-599

The chemical comp. of mango (*Mangifera indica* L.) pulp and canned mango juice were evaluated. Canned mango juice was characterized by a lower content of ascorbic acid, free amino N, reducing sugars and carotenoids than the mango pulp, while the latter was characterized by lower natural total soluble solids, higher pH, lower total sugars and lighter colour. The volatile comp. of canned mango juice was investigated by means of standard-controlled distillation-extraction, liquid-solid chromatography and GC-MS. This combination led to the characterization of 64 volatiles, of them 21 hydrocarbons, 25 alcohols, 12 esters, 2 aldehydes, 2 lactones and 2 other compounds. The volatile components of canned mango juice were quantitatively determined in range of 2260 p. p. b to 10 p. p. b. Limonene, myrcene, cis and trans-ocimene, β-caryophellene and α-terpinolene were the major hydrocarbons of canned juice; meanwhile, methyl butanoate + ethyl 2-methyl butanoate, furfural, α-terpineol and γ-octalactone were the abundant oxygenated compounds. AS

Orange juices

2001

Herman (Z), Fong (CH), Peter Ou and Hasegawa (S). **Limonoid glucosides in orange juices by HPLC.** *Journal of Agricultural and Food Chemistry* 38(9): 1990: 1860-186 i

A simple HPLC method was developed to quantify the major limonoid glucosides in orange juice. This method measures the concn. of the glucosides of limonin, nomilin, nomilinic acid, deacetylnomilinic acid, and obacunone. 14 commercial orange juices were found to contain 331 plus or minus 51 p.p.m. of total limonoid glucosides. Replicate and recovery studies demonstrate that the method is both reproducible and accurate. AS

FATS AND OILS

Fats

2002

Szelag (H), Dtugokecki (Z) and Zwierzykowski (W). **Evaluation of lipids oxidation and effectiveness of antioxidants in W/O emulsions.** *FAT Science Technology* 92(8): 1990: 310-315

The method of investigation of autoxidation in W/O emulsions is presented. Emulsions containing 5 fatty substances were subjected to autoxidation. The influence of the fatty phase comp. on their resistance to oxidative processes was examined. The effectiveness of 5 antioxidants on the autoxidation process was determined. AS

Oils

Avocado oils

2003

Southwell (KH), Harris (RV) and Swetman (AA). **Extraction and refining of oil obtained from dried avocado fruit using a small expeller.** *Tropical Science* 30(2): 1990: 121-131

Sun-dried, destoned, peeled and unpeeled avocados from Kenya were pressed using a small expeller and produced dark-coloured oils. Yields of crude oil were high, giving extraction efficiencies of 79.4-90.3%. Crude oil clarified by gravity was neutralized and bleached with a var. of diatomaceous earths to give light to medium yellow oils. The avocado oil was shown to be rich in oleic acid (67.9-72.2%) and similar in comp. to olive oil. Its potential as an edible oil is discussed. AS

Cottonseed oils

2004

Handoo (SK), Arora (RC), Bagga (KK) and Agrawal (TN). **Refining of cottonseed oil with sodium metasilicate.** *Research and Industry, India* 35(2): 1990: 130-132

Highly coloured cottonseed oil (700 g) was heated to 65-70 C and saturated solution of sodium metasilicate (0.25% w/w) was added slowly with constant stirring. The whole mixture was kept in slow agitation for 30 min. The oil was allowed to settle for 60 min and the silicate soap was separated. It was found that the saturated solution of sodium metasilicate at 1% level (w/w) gives the best refining results with lower processing cost and yields a better product with good colour as compared to caustic soda treatment. The oil loss on refining with sodium metasilicate was 1.0-1.25% lower than the caustic refining loss. GS

Oat oils

2005

Forssell (P), Cetin (M), Wirtanen (G) and Malkki (Y). **Antioxidative effects of oat oil and its fractions.** *FAT Science Technology* 92(8): 1990: 319-321

mhe antioxidant properties of oat oil and its fractions were studied using the Rancimat method. Oat oil extracted with isopropanol increased the induction time of oxidation of lard and tallow from 2 to 8-fold compared with the corresponding times without antioxidants, when applied at 1.0 to 5% concn. Similar trend was noticed with 0.25 to 1.5% concn. of the separated fractions. The most effective fraction was found to be lecithin fractions isolated by supercritical carbon dioxide extraction. N

Palm oils

2006

Klagge (VP) and Sen Gupta (AK). **Quality aspects of palm oil.** *FAT Science Technology* 92(8): 1990: 315-319 (De)

The quality of crude palm oil of different origins is surveyed. The influence of transport and storage conditions on the hydrolytic and oxidative deterioration is discussed. The effect of the crude oil quality on the quality parameters of the refined oil is demonstrated on the basis of colour, stability towards oxidation and keepability in general. Some of this correlations are shown graphically. AS

Vanaspati

2007

Satya Prakash and Sarin (RK). **Nickel in vanaspati.** *Journal of Food Science and Technology (India)* 28(1): 1991: 42-43

Nickel in fine dispersed form is used as a catalyst in the manufacture of hydrogenated vegetable oils from which vanaspati, margarine and bakery shortenings are made. The nickel catalyst is removed by filtration along with filter aids, if required. However, nickel being in colloidal form in hydrogenated vegetable oils, permeates with the final product in traces. The presence of nickel even in traces is undesirable. A survey has been conducted to assess the intake of nickel through these hydrogenated food products. From the survey, it is recommended that a limit of 3 p.p.m. for nickel content may be laid down for these food products in the food standards. AS

Rice bran oils

2008

Thind (PS), Mittal (SK) and Ved Prakash. **Analysis of amino acids from rice bran and rapeseed meal.** *Journal of the Oil Technologists Association of India* 22(2): 1990: 32-35

The total percentage of rice bran amino acids is 30.18 as compared to 22.53 of rapeseed meal. This suggests that the rice bran protein is more nutritive than rapeseed meal and can be a better feed for animal and human consumption. SRA

SPICES AND CONDIMENTS

Spices

2009

Sambaiah (K) and Srinivasan (K). **Secretion and composition of bile in rats fed diets containing spices.** *Journal of Food Science and Technology (India)* 28(1): 1991: 35-38

Feeding mustard and tamarind to experimental rats produced marked increase in bile flow rate. Onion and curry powder in the diet significantly increased the secretion of bile solids without affecting the bile flow rate. The bile acids output was noticeably higher in animals fed either mustard, tamarind, onion or curry powder, and this was accompanied by similar increases in biliary phospholipid and cholesterol. Dietary cinnamon and asafoetida increased biliary secretion of cholesterol and phospholipid without affecting bile acid content. Intragastric single dose administration of clove or cardamom did not influence the bile secretion and comp. The results suggest increased hepatic conversion of cholesterol to bile acids under the influence of dietary mustard, tamarind, onion and curry powder. AS

Chillies

2010

Edwards (SJ), Colquhoun (EQ) and Clark (MG). **Levels of pungent principles in chilli sauces and *Capsicum* fruit in Australia.** *Food Australia* 42(9): 1990: 432-436

Three edible locally available, Australian grown, *Capsicum* spp. (bell Ccapsicum *C. annuum* var. annuum, the green chilli *C. baccatum* var. pendulum, and the red Tabasco chilli *C. frutescens*) and 12 commercially available chilli sauces were assayed by HPLC. Levels of capsaicin and dihydrocapsaicin responsible for imparting the pungent stimuli were determined in both fruits and sauces. Relative proportions and total capsaicinoid contents, up to 0.31% wt./dry wt. of fruit in Tobasco chilli, were comparable to published values for overseas fruit. Capsaicinoid levels in sauces varied considerably from 2.5 mg/100 mL for a mild sauce to 50 mg/100 mL for the hottest sauce. SRA

Pepper

2011

Thomas (PP) and Gopalakrishnan (N). **Green colour retention in enzyme inactivated dried pepper.** *Indian Spices* 28(1): 1991: 6-10

Fresh pepper was sieved, washed and the polyphenol oxidase which causes blackening of pepper was inactivated by (i) microwave exposure, (ii) microwave exposure in boiling water and (iii) boiling water blanching. The berries were dried in a cross flow dryer and were compared with the conventionally sun-dried black pepper for appearance and colour. The product got by microwave exposure for 10, 20 and 30 s was similar to the conventional dried pepper with uniform black colour. When the berries were exposed to microwave in boiling water for 2, 5 and 8 min the product retained green colour better at 8 min exposure. In boiling water blanching when it was exposed for 2, 5 and 15 min the green colour retention was more with the increase in duration of boiling. Microwave exposure combined with boiling water blanching can arrest the enzyme activity better and in a shorter period. GS

Pimento

2012

Gonzalez (A) and Pino (JA). **Effect of aging of *Pimenta dioica* L. tree on yield and composition of the fruit essential oil.** *Revista de Agroquimica Y Technologia de Alimentos* 30(2): 1990: 277-281 (Es)

The effect of age (6 to 30 yrs) of *Pimenta dioica* L. tree on yield and comp. of the essential oil, obtained from fruit by steam distillation, was studied. The essential oil yield did not change significantly on account of tree age but its comp. changed. The eugenol content increased with the tree age and affected significantly the preference of the product. The essential oil from younger trees, with lower eugenol content, was sensorially prefered. AS

Tamarind

2013

Bhattacharya (S), Bal (S), Mukherjee (RK) and Bhattacharya (S). **Rheological behaviour of tamarind (*Tamarindus indica*) kernel powder (TKP) suspension.** *Journal of Food Engineering* 13(2): 1991: 151-158

The shear rate-shear stress data for tamarind (*Tamarindus indica*) kernel powder (TKP) suspensions were obtained using a concentric cylinder viscometer. The effects of concn. (2, 4, 6, 8 and 10% powder) on the flow behaviour index,

consistency index, and apparent viscosity were investigated. The TKP suspensions were pseudoplastic in nature and exhibited yield stress. The Casson and Herschel-Bulkley models were applicable for the detn. of yield stress (r^2 grater than or equal to 0.98, p less than or equal to 0.01) and for fitting the shear rate-shear stress data (r^2 grater than or equal to 0.98, p less than or equal to 0.01), resp. The concn. of flour was found to have a pronounced effect on the rheological behaviour of the TKP suspensions. AS

SENSORY EVALUATION

2014

Bagley (EB), Christianson (DD) and Trebacz (DL). **The computation of viscosity and relaxation time of doughs from biaxial extension data.** *Journal of Texture Studies* 21(3): 1990: 339-354

Stress (T) versus time (t) data were obtained for wheat flour doughs in lubricated, constant crosshead speed, uniaxial compression experiments. These data were then analyzed by using the Upper Convected Maxwell (UCM) Model with two parameters, a relaxation time (λ) and a shear viscosity (n). The numerical solutions to the differential equation governing the behaviour of the UCM model in this experiment can be very sensitive to the initial slope of the stress/time plots. This region of the curve, near t = 0, is most sensitive to experimental error. Best-fit values of λ and n were thus computed for a given curve at a series of initial starting points, t_i, which were sequentially taken up the stress/time plots. There was considerable fluctuation in the best-fit parameters but, nevertheless, values of relaxation time and shear viscosity could be obtained that gave good agreement between computed and experimental stress/strain curves. AS

2015

Rohm (H). **Consumer awareness of food texture in Austria.** *Journal of Texture Studies* 21(3): 1990: 363-373

A word association test was performed to obtain free associations from 208 Viennese students. Frequency of associations confirms that texture is the most important characteristic of food materials besides flavour. The distribution of responses is comparable with data from previous studies in the U.S.A. and Japan. 105 descriptive texture terms were registered. AS

2016

Sinesio (F), Risvik (E) and Rodbotten (M). **Evaluation of panelist performance in descriptive profiling of rancid sausages: A multivariate study.** *Journal of Sensory Studies* 5(1): 1990: 33-52

2017

Otto (DB) and Palmer (SJ). **Ingestion and expectoration sampling methods of four tastes in a model system using time-intensity evaluations.** *Journal of Sensory Studies* 5(1): 1990: 53-70

2018

Aishima (T) and Nakai (S). **Chemometrics in flavour research.** *Food Reviews International* 7(1): 1991: 33-101

This article reviews flavour analysis, multidimensionality of flavour (flavour in general and strict terms), multivariate analysis (advantage of multivariate analysis, algorithms and programs), multivariate calibration, simplex optimisation, pattern recognition (techniques of pattern recognition, correlating instrumental data to sensory properties, searching for latent factors and feature extraction, clustering classification, modeling), nonparametric classification, K-nearest neighbour method, application of SIMCA and KNN, future perspective (artificial intelligence, application and robotics). 203 references. SRA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Insects

Cockroach

2019

Wuttig (U), Baier (U) and Penzlin (H). **The effect of diflubenzuron (dimilin) on the ecdysteroid titer and neuronal activity of *Periplaneta americana* (L).** *Pesticide Biochemistry and Physiology* 39(1): 1991: 8-19

The insecticide diflubenzuron (DFB) affected the larval adult development of *Periplaneta americana* (cockroach) when administered by feeding (1 mg/g diet) or injection (50 µg/larva) usually the larvae died during adult ecdysis due to the inability to split the larval cuticle. Those which did ecdyse died during the 1st day after emergence. The duration of larval instar was prolonged. By radioimmunoassay the *in*

vitro ecdysteroid production of the thorasic gland and the ecdysteroid titer of the hemolymph in the last larval instar was determined. First increase of the ecdysteroid production of the gland was unaffected by DFB, while the second peak was missing. Dise response relationship of the DFB on the spontaneous neuronal activity on the ffuntal ganglion revealed that the action of the DFB seems to be a direct effect on the choline sensitive sites at synaptic regions and also due to the inhibition of acetycholinesterase (E.C.3.1.1.7). NGKK

Tribolium castaneum

2020

Ishaaya (I), Hirashima (A), Yablonski (S), Tawata (S) and Eto (M). **Mimosine, a nonprotein amino acid, inhibits growth and enzyme systems in *Tribolium castaneum*.** *Pesticide Biochemistry and Physiology* 39(1): 1991: 35-42

Non-protein heterocyclic amino acid mimosine (B-[N-(3-hydroxy-4-oxypyridyl)]-$alpha$-aminopr opionic acid) isolated from *Mimosa pudica* and *Leucaena leucocephala* inhibited growth and development of Ist instar larvae of *Tribolium castaneum*. 70% supression in wt. gain of Ist instar larvae was obtained at 0.06% mimosine and about 100% at 0.08%. In 4th instar larvae, 0.3% dietary concn. reduced 58, 63 and 25% trehalase, invertase and amylase activity after 2 days' feeding on treated diet. Appropriate experiments indicated increase of 27, 77 and 93% in protease activity in larvae fed for 5 days on diet containing 0.1, 0.2 and 0.3% mimosine resp. Mimosine had no effect on any enzymes *in vitro*. The observed effect *in vivo* could be due to disturbed protein synthesis leading to altered enzyme activity. The study indicates mimosine is a suppressor of insect growth and may promote the development of a new group of insect control agents. NGKK

BIOCHEMISTRY AND NUTRITION

2021

Usha Chandrasekhar and Chitra (G). **Diet profiles and nutritive value of selected foods eaten by the Kota and Kadar tribes.** *Indian Journal of Nutrition and Dietetics* 27(4): 1990: 101-107

An evaluation of the nutritive value of selected foods eaten by Kota and Kadar tribal communities of Nilgiris and Anamalai hills (Tamil Nadu State, India) is reported. Four foods, Thadi keerai, Puliari keerai (both greens), Pappari (a grain) and popped amaranth from Kota community and five food (*Nuran kizhangu, Soriyan kizhangu, Naar kizhangu* and *Aryan kizhangu* (all tubers) and *Kalmoongil* rice (a cereal)) from Kadar community were selected. The nutritive value of Thadi keerai and Puliari keerai were almost equal to ICMR reported values, the former had higher Ca and Fe and the latter had higher protein and Ca. Ca and crude fibre were less in popped amaranth seeds than that of the unpopped one and the Fe content was more (54.5 mg) in the popped than in the unpopped (11 mg) amaranth seed. Pappari contained 161 kcal per 100 g energy; it is also a good source of Fe, Ca, thiamine and riboflavin. The tubers *Nuran kizhangu, Soriyan kizhangu, Naar kizhangu* and *Ayana kizhangu* had higher energy, Fe and Ca content than reported by ICMR. *Kalmoongil* rice is high in calories, protein (11.5 g/100 g), fat, Ca and P, very high in Fe (52.5 mg), and high in thiamine, riboflavin, ascorbic acid, Cu, Zn and Mn contents. GS

2022

Shamil (S), Cusack (M) and Beynon (RJ). **Effects of proteolysis on the sensory properties of the sweet protein, thaumatin.** *Journal of the Science of Food and Agriculture* 53(1): 1990: 73-84

The effects of different proteases on the sensory properties of sweet protein, thaumatin has been examined. Trypsin and thermolysin, proteases with quite different primary specificities, have little effect upon the sweetness of thaumatin, although in each instance the protein has been extensively cleaved. The retention of the sweet taste is probably due to the disulphide bridge crosslinking which serves to maintain the overall structure of the mole, even when it has incurred proteolytic cleavages. By contrast, subtilism and chymotrypsin effect greater digestion, to the extent that the protein is reduced to small peptides even when the disulphide bridges are intact. Under these circumstances the sweet taste is lost. The sensory properties of thaumatin depend upon the maintenance of a part of the polypeptide chain in a particular conformation. AS

2023

Arntfield (SD), Murray (ED) and Ismond (MAH). **Influence of protein charge on thermal properties as well as microstructure and rheology of heat induced networks for ovalbumin and vicilin.** *Journal of Texture Studies* 21(3): 1990: 295-322

The storage modulus (G') and loss modulus (G") for both ovalbumin and vicilin exhibited bimodal responses with respect to pH: lower values were obtained around the isoelectric points (IEP) and at pH extremes. Around the IEP, protein networks were characterized as highly aggregated with high tan δ (G"/G') values. At pH values away from the IEP, the microstructure appeared as well crosslinked networks with corresponding lower tan $delta$ values. In most cases, (except ovalbumin in acid

conditions) this trend was not reversed at pH extremes. Inclusion of sodium dodecyl sulphate (SDS) at pH 8.5 had an effect similar to increasing pH. For both proteins, network deterioration at high SDS concn. was associated with protein unfolding and increased protein solvent interactions. For networks with low tan δ values (e.g. ovalbumin in alkaline conditions) the G moduli in the final network were influenced by changes during the initial cooling phase, whereas for aggregated products and most vicilin networks, changes in the G moduli during the final cooling phase were prominent. The contribution of electrostatic interactions to well crosslinked networks from both vicilin and ovalbumin was as a repulsive force in the balance required for network formation. For vicilin, electrostatic interactions also appeared to serve as an attractive force even under conditions of reasonable network formation. This may account for the difference in network quality for the two proteins. AS

2024

Schrijver (J). **Indices of vitamin status in man: An urgent need of functional markers.** *Food Reviews International* 7(1): 1991: 1-31

Aspects reviewed in this article are the dietary investigation, clinical examination, lab. analysis and the individual vitamins (fat-soluble vitamins - vitamin A, vitamin D, vitamin E, vitamin K, and water-soluble vitamins - thiamine, riboflavin, vitamin B6, vitamin B12, folic acid, niacin, pantothenic acid, biotin and vitamin C). 158 references. BV

2025

Matheis (G). **Phosphorylation of food proteins with phosphorus oxychloride - improvement of functional and nutritional properties: A review.** *Food Chemistry* 39(1): 1991: 13-26

Phosphorylation with $POCl_3$ (in the absence and presence of essential amino acids) could be a promising tool for improving functional and nutritional properties of food proteins (e.g. yeast protein, zein, soy protein). The amount of P covalently bound to proteins can reach up to 3.9%, but is usually in the order of 1-2%. The *in-vitro* digestibility of food proteins phosphorylated with $POCl_3$ is not adversely affected. The *in-vivo* digestibility (using the *Tetrahymena thermophili* bioassay) has been studied only in 2 cases (casein and zein). While digestibility was not affected in the case of casein, the growth rate of the microorganism showed an 11-fold improvement on modified zein (phosphorylated in the presence of limiting amino acids) over that of the original zein. Phosphoproteins are abundant in nature and some, e.g. milk casein, egg white albumin, egg yolk phosvitin, are part of the regular human diet. Experiments with animals are necessary to determine the digestion of proteins phosphorylated with $POCl_3$ by mammals, and to study the introduction of potentially toxic residues into the proteins that may prevent their direct utilization in foods. AS

2026

Roberts (DCK). **Biological variation in plasma cholesterol.** *Food Australia* 42(9): 1990: 431, 436

This paper looks at studies which have attempted to control for some or all the factors seeking a reliable estimate of within-person variation of plasma cholesterol. Individual variation in plasma cholesterol level is influenced by collection and analysis procedures but other factors come into play depending on the length of time between samples and the state of health of the subject. SRA

2027

Mekhael (KG), Bassily (NS), Mekhael (NA) and Said (AK). **The response of adult rats to varying combinations of dietary lysine and threonine.** *Die Nahrung* 34(7): 1990: 583-590

The response of adult rats fed diets containing amino acid mixtures with varying combinations of lysine and threonine was studied by estimating the change in body wt., organ wt., total N content of organs and the concn. of free plasma lysine and threonine. Analysis of variance indicates a significant effect of threonine, lysine and a significant interaction due to feeding the two amino acids on the body wt., organ wt. and total N content of various organs. Significant effect on the level of the plasma free amino acid was also shown as result of feeding the particular amino acid. Results show that in deficient animals the rates of building body protein are low but are higher in the lysine deficient animals than in the threonine deficient and protein deficient animals. The varying rates of exchanging protein between the various organs in response to changing the levels of amino acids in the diet would mean that total change in body protein or total N balance may not be satisfactory way to determine the protein or amino acid requirements for maintenance. It seems to be necessary to focus down on protein turnover rates in specific tissues. AS

2028

Perez (A), Fernandez (SI), Garcia-Roche (MO), De las Cagigas (A), Castillo (A), Fonseca (G), Herrera (M). **Mutagenicity of N-nitrosomorpholine biosynthesized from morpholine in the presence of nitrate and its inhibition by ascorbic acid.** *Die Nahrung* 34(7): 1990: 661-664

N-nitrosomorpholine biosynthesis and inhibition in mice treated with nitrate, morpholine and ascorbic acid, was studied by means of the mutagenic activity in urine samples. The preincubation method was used and *Salmonella typhimurium* TA 1535 was the test strain. The results suggest that N-nitrosomorpholine biosynthesis was carried out when the animals were fed high doses of nitrate, however ascorbic acid was an inhibitor of this process. AS

TOXICOLOGY

2029

Lewerenz (H-J), Plass (R), Bleyl (DW), Macholz (R), Zelse (S), Kroh (L). **Subacute toxicity study of glucosylthiazolidine-4-carbonic acid in rats.** *Die Nahrung* 34(7): 1990; 623-628

Glucosylthiazolidine-4-carbonic acid, an intermediate of the Maillard reaction between D-glucose and L-cysteine, was given in doses of 0, 25, 50 or 100 mg/kg body wt. by oral intubation to male and female rats for 21 days. General appearance, growth, food consumption, haematology, urine analysis and serum chemistry, including detn. of enzyme activities, organ wt. and macroscopic and microscopic pathology were used as criteria for adverse effects. Effects on the kidneys were indicated by oliguria and decreased sp. gr. of the urine in males and histopathological changes of the proximal tubules in females. The no-effect dose established from this study is 25 mg/kg body wt. AS

Mycotoxins

2030

Ramakrishna (Y), Bhat (RV) and Vasanthi (S). **Natural occurrence of mycotoxins in staple foods in India.** *Journal of Agricultural and Food Chemistry* 38(9): 1990; 1857-1859

A total of 468 samples comprising of 150 samples of sorghum, 102 samples of corn, 58 samples of wheat, 19 samples of whole wheat flour, 37 samples of refined wheat flour and 102 samples of mixed animal feeds were screened for aflatoxins and trichothecene [deoxynivalenol (DON), n valenol, 3-acetyldeoxynivalenol, and T-2 toxin]. Occurrence of aflatoxins was observed in 45 samples of corn (0.02 to 7.4 µg/g concn.), 4 samples of sorghum (0.02 to 0.06 µg/g concn.), and 12 samples of mixed animal feeds (0.04 to 3.0 µg/g concn.). The occurrence of trichothecenes was confined to the rain-affected samples of wheat and wheat products. DON was found to occur in one sample of wheat (0.31 µg/g) and in two samples of whole wheat flour (0.35 and 8.38 µg/g). In refined wheat flour, DON occurred in 11 (0.44-4.85 µg/g), nivalenol in 2 samples (0.1 and 0.03 µg/g), and 3-acetyl-DON in 4 samples (0.64-2.49 µg/g). T-2 toxin occurred in three samples of wheat (0.55-4.0 µg/g) and in one sample of refined wheat flour (0.8 µg/g). The study highlights the need for routine surveillance of agricultural commodities to minimize potential hazards to human health. AS

FOOD LAWS AND REGULATIONS

Nil

Acetone
vanillin & spectrophotometric detn. of acetone 1812
Acinetobacter
temp./pH/NaCl & spoilage Acinetobacter 1978
Adulteration
citrus juice, review 1999
Aflatoxin
cheese, mould growth & aflatoxin in Turkish 1951
groundnut butter, aflatoxin detn. HPTLC/ELISA/HPLC in 1869
Alcohol
food solids & partition coeff. of alcohol 1802
Alfalfa
root saponins, isolation/identification of 1890
Almond seed oil
oxidative stability of crude/processed almond seed oil 1867
Amino acid
pea protein/pea flour, amino acid comp. of 1865
rice bran meal/rapeseed meal, amino acid analysis in 2008
Amylase
baking/milling, fungal alpha-amylase use in 1819
barley scutellum epithelium, alpha-amylase secretion by 1844
lab. method for alpha-amylase analysis 1820
wheat bran, B. subtilis alpha-amylase production on 1855
Amyloglucosidase
starch conversion to ethanol & amyloglucosidase 1826
Amylosis
legume flour, alpha-amylosis rate in precooked 1862
Anchovy
solar drying of anchovy 1985
solar polythene tent & drying of anchovy 1984
Annato
Bixa orellana seed, annato colour extraction from 1837
Antinutritional values
soybean, heat & antinutritional action in 1873
Antioxidant
lipid oxidation, antioxidant effect on 2002
oat oil, antioxidative effect of 2005
Apple
Ca & senescent breakdown of stored Jonathan apple 1894
Red delicious apple, low-dose radiation of 1896
diphenylamine residue in apple/apple cider 1895
Apricot
pectinolysis & juice extraction from apricot 1997
solar energy & dehydration of apricot 1897
Ascorbic acid
fruit/vegetable juice, flow injection with immobilized ascorbate oxidase & L-ascorbic acid detn. in 1998
produce, ascorbic acid content of supermarket/roadside stand 1803
squid, ascorbic acid & frozen storage of 1980
Aseptic processing
system, critical parameters in aseptic particulate processing 1797
Aspergillus niger
tomato, Asp. niger infection in stored Nigerian 1886
Avocado oil
dried avocado fruit, expeller & oil extraction/refining from Kenyan 2003
Babaco concentrates
flow properties of babaco conc. 1898
Babaco purees
flow properties of babaco purees 1898
Bacillus subtilis
wheat bran, B. subtilis alpha-amylase production on 1855
Bacon
gamma-irradiation/frying & thiamine content of bacon 1970
Bacteria
environment & spoilage bacteria 1978
food industry, bacterial enzyme & cyclodextrin glycosyltransferase for 1818
Baked products
texture of baked products 1919
Baking
fungal alpha-amylase use in baking 1819
Banana
ripening, mechanical criteria of banana 1899
Barley
malting potential/physical attrition of barley 1845
scutellum epithelium, alpha-amylase secretion by barley 1844
Beef
gel, NaCl & mechanical properties of beef 1983
soy meal/ground beef mixtures, phospholipase/Cl. perfringens growth in 1828
subprimals, high-temp. conditioning of hot-boned beef 1966
Beverage
groundnut beverage, processing optimization of 1868
yakhni, processing/preservation of Kashmiri 1960
Bile
rats fed diets containing spices, bile secretion/comp. in 2009
Biopolymers
chilling destabilization of biopolymers 1786
Biotechnology
food biotechnology, developments in 1835
Biotin
man, biotin status in, review 2024
Bitter gourd
rings, dehydration of bitter gourd 1889
Bixa orellana
seed, annato colour extraction from Bixa orellana 1837
Blanching
carrot, blanching & pectic substance in 1881
Bovine
milk proteins, hypersensitivity of bovine, review 1962
Brassica napus
see rapeseed
Breadmaking
wheat var. & breadmaking potential 1920
Brewery
fermentation measurement, carbon dioxide evolution & on-line monitoring of brewery 1995
fermentation, ester formation in brewery 1996

Bromoxynil
onion, bromoxynil residue detn. GC in 1879
Browning
milk, carbon dioxide detn. GC during non-enzymatic browning reaction of non-fat dry 1939
Buffalo milk
casein/caseinates, colour characterization of fresh/sour buffalo milk 1964
chhana preparation, buffalo milk based 1953
demineralisation process optimisation for buffalo milk 1994
proteose-peptone components & lipolysis inhibition in buffalo milk 1937
Butter oil
polymer-supported digitonin with cholesterol behaviour & butter oil 1944
Caffeic acid
thiols effects & caffeic acid autoxidation 1806
Cake
starch/sweetener gelatinization temp. prediction DSC for cake formulation 1921 1922
Calcium
apple, Ca & senescent breakdown of stored 1894
Calcium chloride
strawberry, calcium chloride foliar application & postharvest ripening of 1906
Calcium peroxide
dough, calcium peroxide improves properties of 1918
Candida pseudotropicalis
UV-irradiation & mutagenesis of Candida psuedotropicalis 1823
ethyl-methane-sulfonate/nitrous acid & mutagenesis of Candida psuedotropicalis 1824
Canned food
mango juice, chem. comp./volatile constituents of canned 2000
sardine product quality, chilled seawater storage effect on white 1991
Canning
sardine, canning of white 1990
Cans
food in cylinderical plastic cans, computer simulation to evaluate thermal processing of 1792
Capsicum
pungent principles level in Australian capsicum 2010
Carbamate
potato, isopropyl-N-(3-chlorophenyl carbamate) & processing quality of 1882
Carbendazim residues
grape/wine, carbendazim residues in El penedes 1901
Carbon dioxide
brewery fermentation, carbon dioxide evolution & on-line monitoring of 1995
milk, carbon dioxide detn. GC during non-enzymatic browning reaction of non-fat dry 1939
mullet, carbon dioxide & preservation of 1987
sardine, storage-modified atm. & microbial quality of 1992
Carcass
cockrel, dietary tallow & carcass fat in white leghorn 1972
Carica pentagona
see babaco
Carrageenan
kappa-carrageenan, comp. & mechanical properties of 1838
Carrot
drying/blanching & pectic substance in carrot 1881
Casein
buffalo milk casein, colour characterization of fresh/sour 1964
skim milk curd, casein & viscoelastic properties of 1940
Caseinate
buffalo milk caseinates, colour characterization of fresh/sour 1964
skim milk curd, caseinate & viscoelastic properties of 1940
Cellulose
co-immobilized yeast/enzymes & ethyl alcohol production from cellulose 1825
Cereal protein
structure/genetics & properties of cereal protein 1840
Cheddar cheese
Modilase & flavour of buffalo Cheddar cheese 1950
calf/vegetable rennet & proteolysis in Cheddar cheese 1949
Cheese
Lebanese whole milk/filled milk soft white cheese, method for production of 1948
Turkish cheese, mould growth & aflatoxin in 1951
manufacture, milk quality & cheese 1947
packaging & microbiological quality of stored processed cheese 1945
starter organism improvement recombinant DNA technology for cheese 1946
Chemical composition
milk products, chem. comp. of indigenous 1958
milk products, chemical comp. of indigenous 1955
pomegranate juice/seed, chem. comp. of 1905
soy protein-lipid film, pH & chem. comp. of 1874
Chemistry
pea protein, review 1864
Chemometrics
flavour research, chemometrics in 2018
Chhana
packaging & chemical quality of stored chhana 1952
preparation, buffalo milk based chhana 1953
Chicken
chicken fat/menhaden oil based diet & lipids in chicken 1974
Chicken kabab
phosphate & quality of chicken kabab 1973
Chilli
sauce, pungent principles level in Australian chilli 2010
Chilling
biopolymers, chilling destabilization of 1786
Chitin
food processing waste management, chitin recovery/utilization in 1976
Chitosan
fibreboard manufacture, chitosan adhesive for 1788
food processing waste management, chitosan recovery/utilization in 1976
Cholesterol
butter oil & polymer-supported digitonin with cholesterol 1944
cockrel, dietary tallow & carcass fat/serum cholesterol in white leghorn 1972
food, cholesterol detn. LC in 1813
plasma cholesterol, biological

variation in 2026
Chromium
soybean, chromium level in 1872
Chutney
mango slices for chutney, preservation of 1902
Cider
apple cider, diphenylamine residue in 1895
Citrus juice
review 1999
Clarification
sugarcane juice clarification, lime dose for, review 1916
Cleaning
hydrodynamic cleaning effect 1796
Clostridium botulinum
metabolic growth/toxin formation by Cl. botulinum 1827
Clostridium perfringens
soy meal/ground beef mixtures, phospholipase/Cl. perfringens growth in 1828
Cockrel
dietary tallow & carcass fat/serum cholesterol in white leghorn cockrel 1972
Cockroach
diflubenzuron & ecdysteroid titer/neuronal activity of cockroach 2019
Collagen
hake collagen, season & characteristics of 1986
Colletotrichum capsici
tomato, C. capsici infection in stored Nigerian 1886
Colorimetry
tomato product, 5-(hydroxymethyl)-2-furfural detn. in 1891
Colour
aqueous systems, temp. & colour development kinetics in 1793
buffalo milk, casein/caseinates, colour characterization of fresh/sour 1964
pepper, green colour retention in enzyme inactivated dried 2011
rice, colour assessment portable colour meter for milled 1849
Computation
dough, viscosity/relaxation time computation for 2014
Computer
food in cylinderical plastic cans, computer simulation to evaluate thermal processing of 1792
Concentration
milk, conical surface evaporator for concentrating 1938
Consumer
food, consumer acceptance of irradiated 1783
Consumption
milk consumption in Ludhiana 1935
Controlled atmosphere
orange, controlled atm. & tolerance of 1903
Convenience food
grain based convenience food 1917
Cookies
grain based cookies 1917
Cooking quality
rice var. grown in Andhra Pradesh, sensory assessment & cooking quality of 1848
Corn
tortilla chip preparation & protein fraction of quality protein corn 1860
Corn protein
tortilla chip preparation & protein fraction of quality protein corn 1860
Cottonseed oil
sodium metasilicate & refining of cottonseed oil 2004
Curing
chorizo, N & curing process of 1971
Cyclodextrin glycosyltransferase
food industry, bacterial enzyme & cyclodextrin glycosyltransferase for 1818
DNA probes
food industry & DNA probes 1836
Dairy
hygienic design of dairy 1931
Dairy industry
microwave processing for dairy industry 1929
Dairy product
lactase application in dairy product 1926
texture/stabilisation of reduced energy dairy food 1928
Dairying
problems of dairying in India 1925
Decalcification
sugar thin juice, decalcification of 1880
Dehulling
oilseed, dehulling of 1866
sunflower seed, dehulling effect on 1878
Dehydration
see drying
Demineralisation
buffalo milk, demineralisation process optimisation for 1994
Density
squid flesh, air drying & density of 1981
Descriptive profiling
sausage, panelist performance evaluation & descriptive profiling of rancid 2016
Dessert
frozen dessert, texture/stabilisation of reduced energy 1928
Diet
tribal food, nutritive value of Kota/Kadar 2021
Dietary tallow
cockrel, dietary tallow & carcass fat/serum cholesterol in white leghorn 1972
Differential scanning calorimetry
starch/sweetener, gelatinization temp. prediction DSC in 1921 1922
Diflubenzuron
cockroach, diflubenzuron & ecdysteroid titer/neuronal activity of 2019
Digitonin
butter oil & polymer-supported digitonin with cholesterol 1944
Diphenylamine residue
apple/apple cider, diphenylamine residue in 1895
Dithiocarbamate
lettuce/peppers, dithiocarbamate residue analysis in 1888
Dough
calcium peroxide improves properties of dough 1918
viscosity/relaxation time computation for dough 2014
Dressing
seerfish, dressing of 1993
Dryer
paddy, batch type dryer & microbial quality of wet 1847
Drying
anchovy, solar polythene tent & drying of 1984
apricot, solar energy & drying of 1897
bitter gourd rings, drying of 1889
carrot, drying & pectic substance in 1881
potato slabs, shrinkage & drying behaviour of 1883
squid flesh, air drying & shrinkage/density of 1981
ELISA
groundnut butter, aflatoxin detn.

ELISA in 1869
Edible films
moisture permeability of edible film 1784
Egg white
heating condition & gelation of egg white 1975
Energy saving
potato juice, energy saving method for protein from 1884
Environment
spoilage bacteria & environment 1978
Enzyme
Tribolium casaneum, mimosine & growth/enzyme in 2020
food industry, bacterial enzyme & cyclodextrin glycosyltransferase for 1818
food industry, enzyme in 1814
food ingredients production, enzymatic catalysis in 1816
food processing 1815
industrial food enzyme 1817
pepper, green colour retention in enzyme inactivated dried 2011
Enzymes
cellulose, enzymes & ethyl alcohol production from 1825
Essential oil
Pimenta dioica fruit essential oil, tree aging & yield/comp. of 2012
Ester
brewery fermentation, ester formation in 1996
Ethyl alcohol
amyloglucosidase/Sacch. cerevisiae & starch conversion to ethanol 1826
cellulose, co-immobilized yeast/enzymes & ethyl alcohol production from 1825
fermentation, optimisation of continuous ethanol 1822
tangerine, ethanol & off-flavour in 'Murcott' tangerine 1907
Ethyl-methane-sulfonate
Candida pseudotropicalis, ethyl-methane-sulfonate & mutagenesis of 1824
Evaporator
milk, conical surface evaporator for concentrating 1938
Exserohilum rostratum
tomato, E. rostratum infection in stored Nigerian 1886
Extraction
Bixa orellana seed, annato colour extraction from 1837
avocado fruit, expeller & oil extraction from dried Kenyan 2003
pectinolysis & juice extraction from fruit 1997
Extruder
process instrumentation/control in food extruder 1799
temp. prediction in twin screw extruder 1801
Fat
cockrel, dietary tallow & carcass fat in white leghorn 1972
Fats animal
pork muscle, fat content of 1968
Fatty acid
mutton curry, free fatty acid content in commercial canned 1967
Fermentation
ethanol fermentation optimisation of continuous 1822
Fibreboard
manufacture, chitosan adhesive for corrugated fibreboard 1788
Finger millet
comp. of finger millet 1859
Fish
gel, NaCl & mechanical properties of fish 1983
Flavour
buffalo Cheddar cheese, Modilase & flavour of 1950
research, chemometrics in flavour 2018
Flavour compound
2(E)-hexenal breakdown in solvent 1804
Flour
acidulated flour-water suspension, viscometer & viscosity measurement in 1800
diastatic activity of flour & mechanical damage during milling 1841
Flow properties
babaco purees/conc., flow properties of 1898
rice bran protein conc., flow behaviour properties of 1852
Folic acid
man, folic acid status in, review 2024
Food industry
DNA probes application & food industry 1836
enzyme in food industry 1814
Foxtail millet
comp. of foxtail millet 1859
Freezing
oyster meat, freezing & processing of 1977
seerfish, freezing of 1993
French fries
linolenic acid & frozen prefried French fries 1785
Frozen food
French fries, linolenic acid & frozen prefried 1785
Frozen storage
squid, ascorbic acid & frozen storage of 1980
Fructose
high-fructose syrup as substitute for sugar 1914
viscosity of supercooled fructose 1913
Fruit
dried fruit, moisture isotherms of 1887
Fruit juice
flow injection with immobilized ascorbic oxidase & L-ascorbic acid detn. in fruit juice 1998
pectinolysis & juice extraction from fruit 1997
review 1999
Fruit product
rheological behaviour of fruit product 1893
Frying
bacon, frying & thiamine content of 1970
Functional properties
molecular approaches to improving functional properties 1809
wheat, heat & functional properties of 1854
Fungi
baking/milling, fungal alpha-amylase use in 1819
cheese, mould growth & aflatoxin in Turkish 1951
tomato, fungal infection in stored Nigerian 1886
Fusarium
tomato, Fusarium infection in stored Nigerian 1886
Galactosidase
immobilized system for beta-galactosidase 1821
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